THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The expected has happened in the development of the Lake Superior iron ore program for 1902. The base price for old-range Bessemer ores remains at $4.25, as in 1901, and while there is no agreement among Mesabi range producers or on non-Bessemer ores, producers of standard ores outside the association are getting from 15 to 25 cents more than in 1901. Old-range Bessemer ores are being taken up promptly and the business will be practically closed by the end of the week. The firmness of the situation in pig iron and in finished material is being further emphasized by current developments. It had been considered almost foregone that the advance of $2 in bar iron would be followed by a like advance in steel bars but large producers stood in the way and Tuesday's meeting at Pittsburg reaffirmed prices. Bar iron is now uniformly 1.60c, Pittsburg, and the $1 differential on Eastern shipments is abolished. A very heavy bar tonnage is on the books, car works being chief contributors. Agricultural buyers are making good specifications, but are not strongly in the market now. Closely related to the bar trade is the bolt and nut interest, which advanced its prices on nuts $2 a ton last week and 5 to 7½ per cent on machine bolts. On track bolts prices have been reaffirmed. Rivet manufacturers voted also to maintain old prices. There is throughout the finished material market a feeling of strength accompanied by opposition to further advances. General satisfaction is felt at the outcome of the steel bar meeting. In structural material, with orders on the books running close to 450,000 tons, there is no disposition to take advantage of the opportunity. Deliveries are likely to be harder as the season advances, but it is recognized that building projects can easily be killed off by shortsighted views on prices. In both plates and sheets the conditions have grown somewhat stronger as the prospects for the year's business have been better disclosed. Independent sheet manufacturers meet in Pittsburg next week and the question of steel supply may have attention. The lines on billets and sheet bars from domestic sources of supply are tighter, and while German steel is still being sold for Central Western delivery, independent finishing mills prefer the domestic product, which more closely meets their specifications. The probabilities are, in view of the rail and structural demands, that the steel corporation works will have no steel to sell in the market this year. Not only are existing steel works unable to supply the general market, but no steel plant under construction is designed to furnish steel except to connected finishing mills. The pig iron market shows some further advance in basic iron, some large sales having been made by both Northern and Southern furnaces. As high as $17.25 Pittsburg has been paid. Bessemer pig iron has sold at $16.25 and as high as $16.50 at furnace. For foundry iron premiums are paid for early shipment, and the tendency is to make these advanced prices the basis of transactions involving deliveries in the second half. Foundrymen who bought for the second half a month or six weeks ago were able to do considerably better than is possible today. Those who have no contracts for castings reaching beyond July 1 hesitate to pay prices now asked merely to be sure of deliveries. Indications are that many will wait to book business for the second half before covering on pig iron.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Jan 29 1

The pig iron market the past week has shown additional strength and in a few instances prices have slightly advanced. The firmness which pervades the entire market is unprecedented, and with the first quarter not more than one-third over, consumers are already covering requirements for the third quarter of the year. Sales of Bessemer iron amounting to about 5,000 tons for delivery up to September were made in the week at $16 and $16.25 at the furnace, while sales of about 4,000 tons for delivery during the next few months were made at $16.50 to $16.75 at the furnace. Already it is apparent to many furnaces whose output for the first half has been contracted for that they will not be able to meet their specifications to July 1, and a considerable tonnage of Bessemer will run into the third quarter of the year. There has been considerable buying of No. 2 foundry for delivery during the third quarter in the week, the sales amounting to nearly 10,000 tons. Prices ranged from $16.50 to $16.75, while small sales for prompt shipment were made at $17.25 to $17.50 per ton. We also note the sale of 2,000 tons of gray forge at $16.25 per ton, Pittsburg. There is practically no inquiry, however, for forge for delivery during the third quarter of the year. Basic iron continues to command high prices, and we note the sale of 9,000 tons at $17.25, Pittsburg. Very little Southern iron has been sold in this market the past week.

Iron bars were placed on a new basis last week. Heretofore the quotations east and west of Pittsburg varied $1 per ton, and this variation was distasteful to the trade. The new basis is 1.60c, Pittsburg with the full freight added to points east and west. The Eastern bar iron manufacturers have also adopted this base. The situation in iron bars is particularly strong, at the present time the Republic Iron & Steel Co having its output practically sold for the next six months.

A meeting of the steel bar manufacturers was held here yesterday for the purpose of discussing prices, the meeting having been called at the request of a number of mills who urged an advance of $2 per ton. This position was combated, however, by two leading local interests, with the result that no advance was made.

At a meeting of the nut and bolt manufacturers, held last week, the price of nuts was advanced $2 per ton, while machine bolts, all sizes, were advanced 5 to 7½ per cent. The nut and bolt manufacturers reported demand exceptionally strong, and many reported three months' business on hand. The meeting of the wire and wire nail interests will be held in Chicago at the Auditorium Hotel on Saturday, Feb. 1. The report which has been circulated that the American Steel & Wire Co. has not been represented at these meetings is untrue, as one of its representatives will attend the meeting to be held in Chicago. The meeting of the independent sheet manufacturers will be held in this city next Monday, as noted in these columns last week.

In finished lines the market continues very strong. In structural material it is estimated that no less than 450,000

tons are now on the books of the manufacturers for delivery this year, and with the large amount of business to be placed shortly, this year promises to be the largest in the history of the trade. On the other hand, it is probable that the rail production will fall short of that of last year, for the reason that the Lackawanna Iron & Steel Co. cannot take any rail business for delivery this year. The billet situation continues to trouble many independent manufacturers who have no source of raw material supply. Bessemer billets continue to be held at $28 per ton at mill, Youngstown, Wheeling or Johnstown. Offerings of German billets and sheet bars continue to be made in this market, but consumers refuse to buy except when compelled to do so, preferring to deal with domestic manufacturers, for the reason that some of the material imported has not exactly met their requirements.

Owing to an agreement entered into at the last bi-monthly conference of the Amalgamated Association with the American Steel Hoop Co. and the Republic Iron & Steel Co., there will be no shutting down of the mills of these companies in July if no agreement is reached on the bar iron scale. The working agreement entered into provides that the mills should keep in operation after July 1 if no agreement is made, a conciliation committee be appointed on June 15 to adjust matters. This assures the bar iron manufacturers a straight run throughout the year, unless unforseen matters come up in convention to annul this agreement, which is not probable. No such agreement; however, exists between the association and the American Tin Plate Co. and the American Sheet Steel Co.

The American Bridge Co. during the past week received a contract for 700 tons of structural material for shipment to Australia, while the Best Manufacturing Co. of this city has secured a contract for piping for this same plant which amounts to about $100,000.

PIG IRON.—The coke supply during the latter portion of last week was very bad, and while none of the furnaces in this district or the Valleys were compelled to bank their supply became very short. This week, despite the cold snap the supply is much better, and it is believed that with fair weather for a week or ten days the coke producers will be enabled to replenish the stocks always carried by the furnaces. For prompt shipment Bessemer iron has sold as high as $17.50 per ton during the week, sales of about 4,000 tons having been made at prices ranging from $17 to $17.50. No. 2 Foundry for prompt shipment commands almost as high prices as Bessemer, while for forward delivery sales have been made at $16.75 per ton, Pittsburg. We also note the sale of 9,000 tons of Northern basic for future delivery at $17.25 per ton. We revise quotations as follows:

Bessemer, Valley	$16 00 to	16 75
Bessemer, Pittsburg	16 75 to	17 50
No. 1 Foundry	17 25 to	17 50
No. 2 Foundry	16 75 to	17 25
No 3 Foundry	16 25 to	16 50
Gray Forge, Pittsburg	16 00 to	16 50
Chilled Basic, Valley	16 25 to	16 50
Chilled Basic, Pittsburg	17 00 to	17 25

STEEL.—There has been no change in the billet situation, and independent finishing mills continue to pick up small lots of billets here and there to keep their mills in operation from week to week. Bessemer billets are held at $28 per ton at mill, Wheeling, Youngstown or Johnstown, while open-hearth billets are held at $1 advance over this price. We note the sale of 200 tons of sheet bars at $32 per ton for prompt delivery, which is somewhat below our quotations of last week. Bessemer rods continue firm at $34.50 to $35 per ton.

FERRO-MANGANESE.—We continue to quote domestic manganese at $52.50 per ton, while offerings of foreign manganese continue to be made at $50 per ton. These prices are for delivery at buyer's mill in carload lots.

SPELTER.—For prime Western grades 4.20c to 4.25c is quoted, Pittsburg.

MUCK BAR.—A fair demand continues for muck iron and the leading producer quotes $30 per ton.

SKELP.—The demand for skelp is not large, although the market continues firm at 1.80c to 1.85c for iron skelp and 1.75c for steel skelp.

RAILS AND TRACK MATERIAL.—It is already apparent that the rail production this year will probably fall somewhat short of the production last year, owing to the fact that the Lackawanna Iron & Steel Co. has not booked any orders for delivery this year. Prices remain unchanged as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; carlots and less than 200 tons, $30; less than carlots, $32; light rails, 8 pounds, $42; 12 pounds, $38; 16 pounds, $35; 20 pounds, $34; 25 to 40 pounds, $32. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—The plate market continues to show increasing strength and the mills are gradually accumulating a good tonnage. Prices remain unchanged as follows: Tank plate, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c; and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

PIPES AND TUBES.—While some of the independent merchant pipe manufacturers are making slight concessions to secure business the National Tube Co. thus far has not done so, and it is altogether probable from present conditions that none will have to be made for the first half. Discounts to consumers in carload lots are as follows:

MERCHANT PIPE.

	Blk. Per cent.	Galvd. Per cent.
⅛ to ⅜ and 11 to 12 inches	61	48
½ to 10 inches	68½	56

BOILER TUBES.

Steel.

	Per cent.
1 to 1¼ inches	47½
2½ to 5 inches	65½
1½ to 2¼ and 6 to 13 inches	60

Iron.

	Per cent.
1 to 1¼ and 2½ inches	43½
1¾ to 2¼ inches	43
2¾ to 13 inches	53

CASING.

	S. and S. Per cent
2 to 3 inches	58
3¼ to 4 inches	63
4¼ to 12¾ inches	65

BARS.—At a meeting of the bar iron manufacturers held last week the base was advanced to 1.60c, Pittsburg. The elimination of the differential of $1 on Eastern shipments was at the request of many consumers, the former basis not being satisfactory. To the Pittsburg base actual freight is added to all points. At a meeting of the steel bar manufacturers held this week prices were reaffirmed. We quote as follows: Refined iron bars, 1.75c and upwards; Bessemer steel bars, 1.50c; open-hearth, 1.60c; plow beams and cultivator beams, 1.50c, net; channels, angles, zees and tees, Bessemer under three inches, 1.60c; over 3 inches, 1.70c. Hoops and bands are quoted at 1.90c, full extras.

SHEETS.—A better demand for sheets has set in during the past ten days and a number of independent manufacturers have advanced prices of No. 28 in carload lots to 3.10c for prompt shipment. This is $2 per ton above their quotations of a week ago. Follansbee Bros. of this city have decided to erect a four mill sheet plant and also a four mill tin plate plant. Quotations to consumers are as follows: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets are quoted at 70 and 5 and 75 off in carload lots; less than carload lots, 70, and 70 and 5 off.

STRUCTURAL MATERIAL.—The total tonnage now on the books of the manufacturers of structural material is estimated at 450,000 tons, all for delivery this year. The present price of this material appears very tempting to prospective builders and there is no gainsaying that much building is being stimulated as a result of the present level of quotations. They remain unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—A meeting of the wire and wire nail manufacturers will be held in Chicago on Saturday,

Feb. 1, for the purpose of perfecting the agreement entered into in this city some time ago. The American Steel & Wire Co. will be represented at this meeting in the same manner as at the last. Our quotation are as follows: Wire nails, $2.05 to large jobbers, $2.10 in carload lots and $2.15 in less than carload lots; plain wire to jobbers in carload lots $1.95; $2 in less than carload lots; $2.05 to retailers, base, with the usual advances for sizes and galvanizing. Painted barb wire, $2.60 in carload lots to jobbers, and $2.70 to retailers; galvanized barb wire, $2.85 to $2.90 in carload lots to jobbers, and $3 to retailers. Cut nails are sold at $2.05, Pittsburg, in carload lots, and $2.10 to $2.15 in less than carload lots, 2 per cent off in 10 days.

Merchant Steel.—Manufacturers of shafting report a heavy demand and a number of the largest producers have fully three months' business on their books. For less than carload lots some of the manufacturers are quoting 50 off. We revise quotations as follows: Shafting, turned, cold rolled and round, 60 per cent off in carload lots and 50 to 55 off in less than carload lots; tire steel, 1.70c in carload lots and 1.80c in less than carload lots; toe calk, 1.90c to 2c; sleigh shoes, 2c to 2.25c; machinery steel, 1.50c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

Nuts and Bolts.—At a meeting of the nut and bolt manufacturers held last week cold punched and hot pressed nuts were advanced $2 per ton, while machine bolts were advanced 5 to 7½ per cent. The new list on nuts follows: Cold punched, manufacturers or U. S. Standard, off list, square, plain, $5 to $5.10; hexagon plain, $5.30 to $5.40; square, C. T. & R., $5.20 to $5.30; hexagon, C. T. & R., $5.80 to $5.90; hot pressed, manufacturers, U. S. or narrow gauge standard, off list, square blank, $5.20 to $5.30; hexagon blank, $5.80 to $5.90; square tapped, $5 to $5.10; hexagon tapped, $5.60 to $5.70.

Old Material.—We note a sale of 1,500 tons of old steel rails at $17.25 per gross ton, also a sale of 500 tons of turnings at $11.50 per ton, net. We revise quotations, gross tons, as follows: Heavy melting stock, $17.25 to $17.50; steel rails, $17 to $17.25; busheling scrap, $13.50 to $14; No. 1 wrought, $18 to $18.50; iron rail, $22 to $23; cast borings, $8.75 to $9; cast scrap, $15.75 to $16.

Coke.—Coke production in the Connellsville region since the first of the year has not been nearly up to the weekly standard of last year. According to the Connellsville *Courier*, the production for the week ending Saturday, Jan. 18, amounted to 207,420 tons, only about 1,000 tons greater than that of the previous week. Strictly Connellsville furnace coke is held at $2.25 per ton for future shipment while for prompt shipment fully 50 cents above this price can be secured. Foundry coke is quoted at $2.75 per ton; outside coke, about 25 cents below this price.

CHICAGO.

Office of *The Iron Trade Review*, 934 Monadnock Block, Jan. 28

Apart from the falling off in the purchases of pig iron, there is no change in the general situation of the iron and steel trade. In all lines of finished product, the same heavy buying continues, with mills making every effort to keep pace with the demands of consumers. Two weeks ago the transactions in pig iron aggregated an exceptionally large tonnage, caused by several local car wheel and implement interests covering for their needs; but the past week was conspicuous by the large number of small orders placed. Very little material of any kind is to be had in this market for delivery prior to July 1, and a large part of the capacity of mills and furnaces has been taken up for the third quarter of the year. Some are booking contracts for delivery up to Dec. 31, but consumers are not a unit as to placing orders now for the year's needs. Though there is a present scarcity of iron and steel of all kinds, it may be said that manufacturers are making every effort to keep prices down. The fuel supply continues to improve, and there are few furnaces out of blast for want of coke. The new stack of the Iroquois Iron Co. was blown in yesterday, and the second furnace at Bay View was also started up last week. The Illinois Steel Co. has now one furnace idle at the Union Works, one at South Chicago, and two at the North Works, Chicago, all of which are undergoing repairs. The demand for bar iron and steel is undiminished, and an advance of $2 a ton in the price of the former was made last week, from 1.65c to 1.75c. It is reported as quite possible that steel will be advanced this week, but makers are not unanimous on this point. The scrap iron market is firm, some local mill having purchased heavily in the past week.

Pig Iron.—The fuel supply improves daily, and the hope is expressed that furnaces will be running smoothly again within two weeks. Railroads have been making strenuous efforts since the first of the year to overcome the shortage of rolling stock, with the result that there is a good supply of cars in this city at the present time. While the total tonnage closed in the past week was not of such large proportions as in the week previous, the buying may be said to have been more general. Practically all the iron that is now being purchased is for delivery in the third quarter, and some consumers have contracted for their needs for the balance of the year. One Southern furnace has still some iron left for prompt shipment, but this is rapidly being taken up and all the sellers in this city expect soon to be out of the market to July 1. We quote prices as follows:

Lake Sup Charcoal	$19 25 to $19 75	Southern No. 1 Soft	$16 15 to 16 40
Local Coke Fdy. No.1	16 00 to 16 50	Southern No. 2 Soft	15 55 to 15 90
Local Coke Fdy. No.2	15 50 to 16 00	Southern Gray Forge	14 65 to 14 90
Local Coke Fdy. No.3	15 00 to 15 50	Southern Silveries	16 65 to 17 65
Local Scotch Fdy. No.1	16 00 to 16 50	Jackson Co. Silveries	17 00 to 17 50
Local Scotch Fdy No.2	15 50 to 16 00	Ohio Strong Softeners	17 50 to 18 00
Southern Coke No. 1	16 40 to 16 65	Alabama Car Wheel	20 50 to 21 00
Southern Coke No. 2	15 65 to 15 90	Malleable Bessemer	16 50 to 17 00
Southern Coke No. 3	15 15 to 15 40	Coke Bessemer	18 00 to 18 50
Southern Coke No. 4	14 65 to $14 90		

Bars.—While the minimum quotation on iron of 1.65c is nominally maintained by mills, no material is being sold for less than 1.75c, an advance of $2 a ton having been made last week. It is quite probable that steel bars will also advance this week. There is no diminution either in the volume of new business or in specifications against contracts, and it is the rule rather than the exception for consumers to re-enter the market for more material. We quote iron 1.75c Chicago; steel, 1.65c Chicago; out of store, 2c.

Sheets.—There is no reduction in the demand either from mills or jobbers' stocks. Prices are firm and deliveries fairly prompt. We quote No. 27 black from store, 3.40c, and galvanized 70 per cent to 70 and 5 per cent.

Structural Steel.—With the withdrawal of the leading manufacturer from the market on light sections, new business has been limited to the supply. It is quite possible that some of the large office buildings, which were to have been erected in this city this year and for which contracts for the structural steel had been let, will not be built or their height materially diminished, the city council having, on reconsideration of the matter, temporarily decided not to grant permits for the construction of buildings above the 130-foot limit. Dealers report a heavy demand in small lots. We quote mill shipments, carload lots, as follow: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; angles, 6x6 and under, 1.75c; over 6x6, 1.85c; plates, 1.75c; base; tees, 1.80c; zees, 1.75c; lots from store, 2¼c to 3 cents per pound.

Rails and Track Supplies.—There is continued inquiry for steel rails, though few sales have been closed owing to inability to obtain early deliveries. Both local producers are out of the market for some months on track supplies—railroad spikes, six months; light tee rails, three months; track bolts, four months. We quote as follows: Standard rails, $28; light sections, $34 to $36, according to size; out of store, $40 to $44; splice bars, 1.70c to 1.80c; spikes, 1.95c to 2.05c; track bolts and hexagon nuts, 2.80c to 2.90c, out of store, 2.90c to 3c; square nuts, base, 2.65c to 2.75c; out of store, 2.75c to 2.85c.

Billets.—Both Bessemer and open-hearth billets are very scarce, and few sales are reported. We quote Bessemer billets, $31 to $33; open hearth, $33 to $35.

Merchant Steel.—In the last week, there has been heavy inquiry for merchant steel, and further new contracts have been pressed upon manufacturers, notwithstanding the fact that they are already crowded with about all the business they can handle for several months. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.85c to 2c; open hearth spring steel, 2.25c to 2.50c; sleigh shoe, 1.65c to 1.80c, flat sizes; concave and convex, 2c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c,

base; plow steel, 2.50c and upwards, according to quality; toe calk out of stock, 2.40c to 2.60c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 per cent to 10 per cent higher.

PLATES.—The local producer reports that the market is considerably improved, and that the buying in the past week has been of excellent proportions. Our quotations follow: Tank steel, base, ¼-inch, 1.75c to 1.85c; flange steel, 1.90c to 2c; marine steel, 1.95c to 2.10c; firebox steel, ordinary, 2c to 2.10c; special, 2.25c and upwards. Jobbers are selling from store according to size, as follows: Tank steel, 1.90c to 2c; flange steel, 2.10c to 2.25c; marine steel, 2.40c to 2.50c; firebox steel, ordinary, 2.40c to 2.50c; special, 2.50c and upwards.

CAST IRON PIPE.—Some contracts of fair proportions for prompt shipment have been placed by consumers on the Pacific coast, and there has also been some buying for future shipment from consumers in the central and northwestern states. The recent cold snap has resulted in the withdrawal of many inquiries, however, from the latter section. We quote as follows: 4-inch water pipe, $29; carload lots, f. o. b. Chicago; 6-inch water pipe, $28; 8-inch and larger sizes, $27; gas pipe, $1 per ton higher than above prices.

MERCHANT PIPE.—Mills report they are now in good condition to furnish material for prompt shipment, having a plentiful supply of cars and having caught up on orders. New business is slight, this being the dull season. There is a fair demand from store for boiler tubes.

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ and 11 to 12 in.	59.5	46.5
¼ to 10 inches	67	54.5

BOILER TUBES.

	Steel Per cent.	Iron Per Cent.
1 to 1¼ in.	40	35
1¼ to 2½ in.	47½	37½
2½ to 5 in.	57½	47½
6 in. and larger	45	40

WIRE AND WIRE NAILS.—The leading producer reports a heavy volume of business from all parts of the territory tributary to Chicago, and it is found extremely difficult to furnish the material as promptly as desired. Stocks everywhere are low and product shipped from the mills goes into immediate consumption. Independent manufacturers report a corresponding increase in their sale. We quote prices as follows: Painted barb wire, carload lots, $2.70; galvanized barb wire, in carload lots, $3; wire nails, carload lots, $2.15; jobbers' prices to retailers, 10 cents higher than above quotations for carloads and 15 cents for less.

COKE.—The local receipts of coke grow larger daily, and some consumers are even accumulating stocks. Spot coke commands $5.50 to $6 a ton, and contracts for future delivery are booked on the basis of $5.00.

OLD MATERIAL.—Prices are very firm, and we have made an advance of 50 cents a ton on some grades. A large local consumer bought considerable material in the past week, though there is a corresponding decrease in the demand from foundries, caused by the improved shipments of pig iron. The following are approximate prices in gross tons:

Old iron rails	$21 50 to $22 25	Relaying rails	27 00 to 28 00
Old steel rails, 5 ft. and up	21 00 to 21 50	Old wheels	$16 50 to $17 00
Old steel rails, mixed	14 00 to 15 00	Heavy melting steel	14 50 to 15 00
		Mixed country steel	10 50 to 11 00

The following are selling prices per net ton:

No. 1 R. R. wrought	$16 00 to $16 50	Steel Axles	$18 50 to $19 00
No. 2 R. R wrought	14 00 to 14 50	Cast borings	6 00 to 6 50
Dealers' forge	13 50 to 14 00	Wrought turnings	10 00 to 10 50
No. 1 busheling	11 00 to 11 50	Iron axle turnings	12 00 to 12 50
No. 1 R.R & mach. cst.	11 75 to 12 25	Steel axle turnings	11 00 to 11 50
Railway malleable	12 00 to 12 50	Stove plates	8 50 to 9 00
Country malleable	11 50 to 12 00	Old iron splice bars	16 50 to 17 00
Iron axles	21 00 to 21 50		

CLEVELAND

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Jan. 29.

The meeting of the producers of old range Bessemer ores, referred to last week, was followed by two others, at which the details preliminary to putting these ores on the market for 1902 were completed. The expected base price of $4.25 for an ore containing 63 per cent metallic iron, 0.045 phosphorus and 10 per cent moisture, was established, and other ores received valuations according to the phosphorus table prepared by the association some years ago. There was a slight deviation in the case of two or three hard ores, the owners of which made a reduction in price, as compared with last year, in view of the fact that the large use of Mesabi ores, due to their very low prices last year, had been somewhat at the expense of the hard ores. The announcement of prices was followed promptly by sales, the destination of a good many ores being quite well understood beforehand. Leaving out of the account old range Bessemer ores produced from mines of consumers, there is scarcely more than 1,750,000 tons of old range Bessemer ores available for the market the coming year. Last year's advance estimate of production was a good many hundred thousand tons in excess of the old range Bessemer ores actually produced. This year allowance has been made for an increased consumption of 8 to 10 per cent, with the probabilities that shipments will again fall below January estimates. The bulk of the old-range Bessemer ores are taken at this writing, and the probabilities are that by the end of the week the destination of the most of the balance will be known. The United States Steel Corporation mining companies, with total production of about 12,500,000 tons last year, make the merchant ore situation much simpler than in former years. The steel corporation is not a buyer this year, nor is it a seller, except of certain ores from the Mesabi range, which are handled through Cleveland offices in accordance with old arrangements.

There is no formal agreement on prices of Mesabi ores nor on non-Bessemer ores. Yet under individual action, prompted by an interchange of views on the subject, higher prices are being secured than those of last year. Producers of the best Mesabi ores are getting 25 cents, and in some instances more, above the price of 1901. On old-range non-Bessemer ores from 15 to 25 cents advance over prices for 1901 is being secured. The sale of Mesabi and non-Bessemer ores will be longer drawn out than in the case of the old-range Bessemer. A good beginning has been made and the choice ores for foundry and basic iron have had a very considerable sale.

PIG IRON.—The Bessemer pig iron situation for the first half of the year has been fixed by the large sales of two weeks ago. The coming weeks will probably show scattering sales at prices decided by the urgency of deliveries. Already $16.50 at furnace has been paid for February and March iron and the price can easily go higher on the little iron that can be had in the next four of five months. On foundry iron the price asked for forward deliveries is being determined by that at which the limited amount of iron available for the first half is being taken. By some Valley sellers No. 2 foundry is quoted at $16 at furnace, and the question foundrymen have before them is whether they are warranted in paying this price to insure deliveries, while the basis on which their castings are to sell for the second half is still undetermined. Both views are represented in current business—in those who are covering a part of their requirements for the second half, and in those who do not expect to pay a higher price for the second half and are willing to pay it when they have contracts for castings in hand for that period, but not before. Current business under these conditions is not as heavy as before the last advances, and it may require a month or two to clear up the situation. Where forge iron can be had $15.75 at Valley furnace is paid. Basic is strong at $16.25 at furnace. We quote f. o. b. Cleveland:

Bessemer	$16 50 to $17 00	Scotch No. 1	$16 50 to $17 00
No. 1 Strong F'dry	16 50 to 17 00	Scotch No. 2	16 25 to 16 75
No. 2 Strong F'dry	16 25 to 16 75	Gray forge, Valley	15 50 to 15 75
No. 3 Foundry	15 75 to 16 00	LakeSuperior charc'l	18 00 to 19 00

FINISHED MATERIAL.—The advance in bar iron last week to 1.60c Pittsburg, was made by one producer, apparently without consultation with other manufacturers, but it has been followed by similar action by the leading producer of iron, all quotations being now 1.60c, Pittsburg. This was considered the forerunner of an advance in steel bars, but large interests opposed this move at the Pittsburg meeting on Tuesday, and 1.50c Pittsburg is still the quotation on Bessemer bars. Bolt and nut manufacturers have been in the market for bars in the past two weeks and several thousand tons have been closed, much of it in the past week. We quote bar iron out of stock, Cleveland, at 1.75c to 1.80c. Though the mills are well booked they are making fairly good deliveries. Structural mills are so full of orders that the

question of deliveries on business that comes up in the next two or three months is likely to become a serious one. The pressure for light angles may be relieved somewhat by turning some mills from bars to small shapes. We continue to quote beams and channels up to 15 inches at 1.70c, Cleveland. On orders out of stock Cleveland prices range from 2½c to 2¾c. Sheet mills, both independent and consolidation, find a good demand for black sheets, and the scarcity of steel tends to firmness in quotations for sheets. Mill shipments to consumers are quoted as follows for Cleveland deliveries: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c, with usual extras for less than carload lots, etc. Round-lot quotations from store are as follows: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 25-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c. The above are for one pass through cold rolls. For full cold rolled the extra is .10c. Galvanized sheets are quoted 70 to 70 and 5 off list. The plate market is steady at 1.70c Cleveland for tank. Recently pending vessel orders have not yet been placed. Deliveries from mills are quite prompt, but business is accumulating in the hands of producers.

OLD MATERIAL.—There are no changes of any importance in the market for scrap. The asking price is in some instances higher owing to the continued strength and firmness in the finished material market. The few changes due to this feeling are noted in the following quotations, all in gross tons:

Old steel rails, rolling mill lengths	$17 00 to 18 00
Old steel rails, short lengths	5 75 to 16 50
Iron rails	21 00 to 22 00
No. 1. railroad wrought	16 50 to 18 00
Mill scrap	14 50 to 16 00
No. 1. machine scrap	14 00 to 14 50
Machine shop turnings	12 50 to 13 00
Cast borings	6 50 to 7 00
Grate bars	8 50 to 9 00
Sheet iron	9 00 to 10 00
Stove plate	10 00 to 10 50
Car wheels	15 50 to 16 50

CINCINNATI.

Jan. 29.

There has been no change in the iron trade situation since the first of the year in this district. The buying of pig iron has proceeded along the same lines. Consumers are generally covered for the first half, and are now going into the second half of the year. Some are content for the present with purchases running to July. The demand for all kinds of finished material has kept up to the same extent, and it is even complained that deliveries in some lines are not as good as they were some weeks ago. Prices have been maintained in the pig iron market and the prices for finished material have in one instance advanced. There appears to be no sign of weakness anywhere. The local demand for finished material is a good indication of the situation. The local organization of iron store interests will meet on Thursday, when it is expected that the price of iron bars and steel bars will be advanced to $2 out of store.

PIG IRON.—The feature of the pig iron market during the week has been the continuance of the strong demand for basic iron. Besides a considerable movement of basic to the East, local iron firms have booked good orders for this grade. The largest single order was for 12,000 tons, while another was booked for 5,000 tons; and there have been several for 1,000 tons. There has been buying of foundry grades for delivery well through the second half of the year, though orders for foundry iron for delivery during the next few months are very hard if not altogether impossible to fill. One iron firm had an order today for 500 tons of No. 4 foundry to be delivered beginning March 1, and is absolutely at sea as to where to turn for the iron.

Prices f. o. b. Cincinnati are unchanged, with the exception of a slight advance in Southern car wheel, and the following quotations rule:

Southern Fdy. No. 1	$15 25 to $15 50	Gray Forge	$13 75 to $14 00
" " 2	14 75 to 15 00	Northern Fdy. No. 1	17 10 to 17 35
" " 3	14 25 to 14 50	" " 2	16 60 to 16 85
" " 4	13 75 to 14 00	Southern C.W. iron	19 00 to 19 50
So. Fdy No 1 soft	15 25 to 15 50	Malleable coke iron	16 60 to 16 85
So Fdy. No. 2 soft	14 75 to 15 00		

FINISHED MATERIAL.—There has been some uncertainty as to prices on bar iron and bar steel this week. The advance of $2 a ton on bar iron appears to have held, but bar steel apparently did not sustain the higher price that was made on it here last week. Bar iron is now selling at 1.72c Cincinnati on the basis of 1.60c Pittsburg. Bar steel was quoted at 1.72c Cincinnati, but it is understood that because one of the largest manufacturers did not come up with the others this price did not rule, and the price that is still quoted is 1.62c Cincinnati on the basis of 1.50c Pittsburg. It is understood here, however, that all interests will get together tomorrow, and if so, 1.72c will rule at Cincinnati. Store prices on bar iron and steel have not changed with the change in mill prices, store prices being still 1.90c on both. There will be a meeting on Thursday, at which store prices will be advanced to 2c for bars. Other prices remain the same: angles at 2c; plates, 1.85c; sheets No. 28, 3.35c to 3.40c; No. 12 blue annealed, 2.35c.

OLD MATERIAL.—The strength in the pig iron market has kept the scrap market firm as well. There have been no important deals noted, but there has been some good business in a general way. Prices remain unchanged at Cincinnati as follows:

Old No. 1 Wrought Railroad, net tons	$ 15 50 to 16 00
Cast Machine and Foundry, net tons	12 50 to 12 75
Old Iron Rails, gross tons	21 25 to 21 50
Old Steel Rails, gross tons	18 00 to 18 25
Old Short Lengths, gross tons	15 00 to 15 25
Old Iron Axles, gross tons	21 00 to 21 50
Old Iron Car Wheels, gross tons	16 00 to 16 25
Stove Plates, gross tons	9 75 to 10 00
Wrought Turnings, net tons	11 50 to 11 75
Cast Borings, net tons	5 50 to 6 00

PHILADELPHIA.

Jan. 28.

With practically no iron in sight, on which deliveries can be made short of 60 days, current quotations naturally become erratic. But little business is being done, as all seem to realize that it is useless to try to buy or sell that which does not exist. The few fortunates who can supply urgent appeals for immediate requirements can practically name their own terms. In addition to the empty market for the next couple of months comes the announcement that there remains but little unsold iron for the remainder of the first half of the year. There is a probability that if buyers continue in the market, this may result in further advances. As it is it will take a long time to restore normal conditions, as furnace yards have exhausted their stocks of coke, and in some cases ore, and even with improved transportation facilities it will be quite a while before shipments can be made with certainty.

PIG IRON.—Prices on current business are largely a matter of private arrangement. This is especially true where deliveries fall within the first quarter of the year. Some orders for long-time shipments have been placed at $16.50 to $17. A fair average of current quotations for Philadelphia and nearby deliveries would be about as follows: No. 1 X foundry, $18 to $18.50; No. 2 X foundry, $17 to $17.75; No. 2 plain, $16.50 to $16.75; standard gray forge, $16 to $16.25; ordinary gray forge, $15.25 to $15.75; Basic (chilled), $16 to $16.50; Bessemer, $19 to $19.50.

FINISHED MATERIAL.—Considering the season and other conditions the market is holding its own to a remarkable degree. Business continues to pile up in the structural field and mills find themselves unable to catch up with demand. The plate mills have about all the trade they can handle comfortably. Bars have been advanced a dollar a ton. For city and seaboard deliveries prices are as follows: Plates, ¼-inch and thicker, 1.75c to 1.80c; bars, iron or steel, 1.62½c to 1.70c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

OLD MATERIAL.—Although there is an apparent scarcity of some kinds of melting stock the market may be said to be slightly easier, owning to the unwillingness of consumers to respond to further advances. Bids and offers for deliveries in buyer's yards are about as follows: Choice railroad scrap, $20 to $20.50; No. 2 light scrap, $12.75 to $13; machinery cast, $14.50 to $15; heavy steel, $18.25 to $18.75; old iron rails, $21 to $22; wrought turnings, $13 to $13.50; cast borings, $7.75 to $8.25; old car wheels, $17 to $17.25; old iron axles, $24 to $25; old steel axles, $20 to $21.

Charles H. Morgan, president of Morgan Construction Co., Worcester, Mass., sailed for France on the 21st inst.

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FOUNDRY AND STEEL WORKS ACTIVITY IN 1901.

The statistics of pig iron production in 1901 which have just been completed by the American Iron and Steel Association appear in another column. They reflect at once the splendid activity in the iron trade last year, the total production of pig iron reaching 15,878,354 gross tons, or nearly 2,100,000 tons more than in 1900. If the exact record of consumption were available it would show a greater gain over 1900, for in the latter year stocks accumulated, while in 1901, as is well known, stocks were drawn upon, Mr. Swank's figures for unsold stocks showing a decrease of 372,000 tons in the year.

The increase of production of steel-making pig iron was very marked. Bessemer iron was 60.4 per cent of the total, or 9,596,793 tons, against 57.6 per cent in 1900, 60 per cent in 1899 and 62.3 per cent in 1898. In the following table the marked increase in Bessemer and basic pig irons over 1900 is shown, together with the records for the two years preceding 1900. All figures are in gross tons:

	1898.	1899.	1900.	1901.	1901 comp. with 1900.
Bessemer	7,337,384	8,202,778	7,943,452	9,596,793	inc. 1,653,341
Basic	785,444	985,033	1,072,376	1,448,850	inc. 376,474
Fd'y. and forge	3,651,106	4,432,892	4,773,414	4,832,711	inc. 59,297

The fact that no new Bessemer steel capacity is under way in the United States apart from the new Lackawanna plant near Buffalo, has been frequently commented upon. The flexibility of existing capacity has been demonstrated in the past year, however, all the converter plants of the country having been pushed for extraordinary records. The table above emphasizes again the wonderful growth of the open-hearth steel industry. Between 1898 and 1901, it will be seen, the output of basic iron has nearly doubled, and the output for 1901 was nearly 40 per cent greater than that of 1900.

Apparently the increase in pig iron consumption in 1901 was almost entirely in iron that went to steel works. But the stock statistics tell a better story for the foundry industry. Assuming that the consumption of forge iron was only moderately greater in 1901 than in 1900—and the operations of the Republic Iron & Steel Co. would indicate that it was greater—the pig iron statistics reflect a considerable increase in foundry operations in 1901 over 1900. Turning to the figures for unsold stocks we see that in the Lehigh and Schuylkill valleys, centers of foundry iron production stocks decreased from 94,813 tons on June 30 to 8,539 tons on Dec. 31, 1901. In Alabama the decrease was from 95,815 to 4,393 tons; in Tennessee from 11,595 to 1,361 and in New York from 14,930 to 4,907 tons. Today the foundry iron trade is a key to the prosperity of the iron trade as a whole. With absolutely open competition, prices have advanced under enlarging demand, and it will be difficult for any buyer entering the market in the next five months to secure any iron for delivery before July 1. The increase in the number of iron foundries in the United States from 4,145 at the opening of 1900 to 4,615 on Jan. 1, 1902, does not tell the whole story. The additions to existing plants have been a constant and notable factor.

Great as is the pig iron production for 1901, and making so great an increase over 1900, all indications point to a still greater record in 1902.

IRON AND STEEL EXPORTS IN 1901.

Advance sheets just received from the Treasury Department show that our exports of iron and steel and machinery last year fell off to $102,539,797 as against $129,633,480 in 1900 and $105,690,047 in 1899, when for the first time the total passed $100,000,000. Pig iron fell from 286,687 tons in 1900 to 81,178 tons in 1901; steel rails from 356,245 tons to 318,055 tons, of which 65,797 tons went to British North America, 53,456 tons to Mexico, 52,569 tons to South America and 54,221 tons to Asia. Billet exports were but 28,614 tons against 107,385 in 1900. Machinery exports were considerably below the records of 1900 and 1899.

EMPLOYERS' LIABILITY FOR ACCIDENTS.

The responsibility of the employer has received some attention from State legislatures in this country, but we have seen no enactments so general or radical as are found in some European countries. The throwing of a greater burden of proof upon the employer in any case where reasonable doubt exists as to the responsibility of employer and employe for the causes of accidents, has been a feature of the more recent measures adopted in Great Britain and the common law has so far been modified. In Germany there is a compulsory provision for those accidents which may arise in the course of everyday shop duties and this insurance feature is apparently favorably considered in other countries. In fact, if it be conducted on a purely voluntary plan it is actually the procedure followed by several progressive manufacturers in the United States. It may be but the partial, but eminently practical, plan adopted by the Brown & Sharpe Mfg. Co., the Builders' Iron Foundry, and other establishments which provide for a fund administered by the employes for the sick and the bereaved. There is a wide step from these helpful and co-operative organizations to the elaborate program recently an-

nounced by the leading steel interest. All, however, contemplate the possibility of the wage earner falling upon misfortune and propose to meet that need.

It is one thing, however, to organize this plan within the limits of a single manufacturing company and quite a different matter when it is to be applied by the fiat of National government. There is a personal spirit, an individuality about the effort of a single company that tends to efficiency, to a common zeal that proves a very potent factor in the proper administration of relief systems. There may be paternalism about the project, but this may be perceived and avoided by a judicious modification of the plan or its carrying out. The handling of so delicate a matter by the average legislator, a man who may have almost any other than a shop training, would be most uncertain. The door would be open for every description of "labor" jobbery, and antagonisms might be aroused that would be fatal to the success of the plan.

Belgium, the bustling little kingdom that has been forging ahead in the industrial race, has taken the matter in hand and a measure is under consideration whose features are thus summarized:

The leading idea upon which the workmen's accident bill which is about to be introduced into the Belgian Chamber of Representatives is based is that responsibility for accident shall be borne jointly by master and workman. The workman will be obliged to insure himself; the employers will be obliged to provide for the contingency of prospective indemnities. The only class of accidents to which an exemption is applied are those caused "wilfully." These no longer come under the head of "accidents" in the ordinary acceptation of the term. When any accident happens in the execution of a contract, be it through negligence or otherwise, the workman may claim compensation should he be either partly or totally disabled for a period exceeding fourteen days. The general idea of the bill is to treat *en bloc* the whole category of preventable accidents, and to divide the liability between master and workman. Insurance is made compulsory on both sides.

So far as it may be understood from the above the measure appears to be an effort for the avoidance of the punitive element that is found in the English method. Presumably the injured party may apply for aid to a general fund fed by receipts from employer and employe. We are not told how the two classes of injuries, those incurred by negligence of the one party or the other, are to be separated, but there is evidently very broad and sweeping demarcation between them established by the contemplated statute. Whatever the details, the general features indicated are an interesting exhibit of the manner in which national legislatures are approaching the great questions growing out of the employment of large bodies of men under corporate management.

The Rand Drill Co. of New York has opened an office at 710 Park Building, Pittsburg, with F. C. Weber in charge. The company manufactures air and gas compressors, blowing engines, rock drills and quarry and mining machinery.

Frank F. Amsden has resigned as furnace manager of the Tidewater Steel Co. and goes to Harrisburg, Pa., to become manager of the Paxton Furnaces.

At a meeting of the stockholders of the Pittsburg Valve Foundry & Construction Co., held this week at Pittsburg, the old board of directors was re-elected as follows: Henry M. Atwood, president; J. T. Speer, vice-president; Moses Atwood, secretary; Charles A. Anderson, treasurer and R. J. Wilson.

SHARON STEEL COMPANY.

(Special Telegram.)

PITTSBURG, Jan. 29.—The annual meeting of the Sharon Steel Co. of Sharon, Pa., was held yesterday. George Flinn, Peter Shields and John Fahnline were elected additional directors and the old board was re-elected. The directors elected George W. Darr of New York, president; John Stevenson, Jr., Sharon, Pa., vice-president; V. M. Delameter, Sharon, secretary, and David Adams, treasurer. The treasurer's report showed net profit for the six months ending Dec. 31, 1901, $259,275.98, which was considered a very good showing, inasmuch as the period covered was a trying one in installation of new mills and machinery throughout the entire plant with many breakdowns and unavoidable delays in the way of coal and coke shortages during the months of November and December. The sales department reported the entire tonnage of the mills sold for the first six months of present year at good prices, with no indications of a recession in prices.

Bessemer Ore Association.

At the annual meeting of the Bessemer Ore Association, held in Cleveland last week, Leonard C. Hanna, executive head of the firm of M. A. Hanna & Co., resigned the presidency of the association. For nine years Mr. Hanna has been president of the association, and in all the counsels and plans of the ore men has led with rare ability and discrimination. The association was formed at a time when demoralization was dominant in the Lake Superior ore trade. It was organized in the face of many predictions of failure and against difficulties that in other hands might easily have been insurmountable. With perhaps the single exception of the prices established in 1896, the decisions of the association have commended themselves to the trade as wise and conservative, and the organization has been a balance wheel to the Northern iron trade to a far greater extent than many appreciate. Its statistical work and its development of a scientific method for representing to a nicety in a price schedule the value of any ore as compared with all other ores—these alone have far more than justified its existence. Furnacemen have given ready testimony to the benefit the association has been to their industry in maintaining uniformity of prices through the year and in eliminating the speculative element that was formerly inseparable from ore contracts entered into oftentimes 15 and 16 months in advance of their termination.

While Mr. Hanna has expressed a desire several times in the past few years to be relieved from the responsibilities of the presidency, he has been persuaded to retain it. This year he again urged his request, and it was acceded to. The office has passed to most competent hands, in the election of Wm. G. Mather, president of the Cleveland Cliffs Iron Co. Mr. Mather's company is the largest merchant producer of old range ore in the Lake Superior region.

W. A. Kingsley has resigned as head of the bar iron department of the Chicago office of the Carnegie Steel Co., Illinois Steel Co. and American Steel Hoop Co., to become general manager of a machinery manufacturing concern in Youngstown, Ohio. B. E. Hamilton, formerly salesman in the department, has been appointed to succeed him.

J. B. McIntire, 1010 Park Building, Pittsburg, is in the market for the entire equipment of a Portland cement plant. Engines, boilers, dryers, crushers, grinders, mills, kilns, elevators, conveyor bins, larries, generators, motors, cranes, pumps, blowers, tanks and building material. Mr. McIntire is open to communications from concerns that can furnish the above.

The Maryland Sheet & Steel Co., Cumberland, Md., is in the market for one good second-hand drill press about 60 inches and one good second-hand planer about 48x48x12.

The 1902 catalogue of the Frank Mossberg Co., Attleboro, sheet metal stampings, special tools and machinery. To avoid possible confusion we may note that this firm has no connection with any other bearing the name of Mossberg.

CASE-HARDENING.

The American Carburizing Co. of 160 Pearl street, New York is rapidly introducing its material for case-hardening wrought or malleable iron and low or high carbon steel, to manufacturers whose work requires uniform results at a minimum outlay. The compound weighs about two-thirds as much as bone dust and similar substances and requires one-third to one-half the time in the furnace. Another characteristic is the protection it affords, particularly to steel articles, which can be heated to the melting point of cast iron without detriment.

The pieces to be case-hardened are packed in cast iron boxes of a size suitable to the pieces. For small work to be done in large quantities, 12x24x12 inches is a convenient size. Where small pieces are to be done a few at a time, the boxes should be as small as will accommodate them with a thickness of carburizer around them about one-half inch thick. The boxes should be made of a quality of cast iron which resists heat well, such as a good quality of stove plate. They are cast open at the top and should have a wall thickness of ½ to ¾ inch. When a box is charged, it is filled full of the articles to be hardened, carefully packed with the carburizing material so that no two pieces shall touch and so that no pieces shall come nearer the sides of the box than about one-half inch. Small articles may be placed closer than this distance if great care is taken that none actually touch the sides. If any articles touch one another or the sides of the box, they will not be carburized at the point of contact and are quite likely to fuse fast and be spoiled.

The open top is covered with pieces of sheet metal, say ⅛ inch thick, cut so as to nicely fill the opening, and then the edges are luted with fire-clay to make the box as nearly air-tight as possible. They may be heated economically in a coal or coke furnace where large quantities of work are being done. There are furnaces on the market specially designed for this class of work. There are also gas furnaces which are well adapted to this class of work, especially where small quantities are being done at a time. The gas furnaces heat quickly and require very little attendance, which more than offsets the extra fuel cost over the coke or coal furnace.

The boxes should be kept at a uniform temperature as nearly as possible during the time they remain in the furnace. The temperature recommended is that commonly known as orange or somewhat higher, if the cast iron boxes will stand the heat. There is little or no danger of harming steel pieces while packed in carburizing material, since they are protected from the atmosphere and gain carbon instead of losing it, as is the case in an open fire. When the boxes have been in the furnace such a time as experience has demonstrated to be proper, they are hauled out carefully, since cast iron is quite fragile at high temperatures, and the whole contents dumped into a receptacle containing water. It is the usual practice to have a wire screen suspended in the water and counterbalanced so that the articles may be raised to the surface when cooled without "fishing" for them at the bottom. Another method recommended by the American Carburizing Co. and found preferable in many cases, is to pull out the boxes and store them where they will cool down slowly. When entirely cold, the pieces are removed and reheated in an open fire to the proper temperature (cherry for small pieces and a bright cherry for large pieces) and then dipped in clear cold water.

PITTSBURG, Pa., Jan. 29.—The plant of the Braddock Machine & Mfg. Co. is today being disposed of to new interests. Details regarding the new ownership will not be obtainable until the new owners have taken charge.

Tate-Jones Co., Inc., Pittsburg, have a neat booklet treating of fuel oil and its utility. This includes a description of the Kirkwood duplicate pumping and heating system, the Kirkwood burner and some useful information regarding the proper methods and conditions for burning fuel oil. The general convenience of this source of heat and the attention directed to new oil fields make this little work a timely publication.

NEW PITTSBURG TIN PLATE ENTERPRISES.

(Special Telegram.)

PITTSBURG, Jan. 29.—H. A. Strauss of Wheeling, W. Va., has been engaged by Follansbee Bros. & Co. of this city to design their new tin plate and sheet mill, which will be erected within the next sim months. It has already been decided to erect a four-mill tin plate plant and a four-mill sheet plant. The location has not been definitely determined upon, three sites being under consideration. One of these is in the Wheeling district and the Wheeling Board of Trade is working to secure the location of the plant. It has not yet been definitely determined whether an open-hearth plant will be erected, although it is probable that this will be done in order to insure a supply of steel. A. E. Piper, formerly superintendent of the Star plant of the American Tin Plate Co., located in this city, has been engaged as manager of the plant. The dippery operated by Follansbee Bros. & Co. in Allegheny will be removed to the site of the new plant.

The Cadwallader interests of this city, tin plate jobbers, have applied for a charter for the Cadwallader Tin Plate & Metal Co., with a capital of $150,000. The company will operate a dippery in Hazelwood. The incorporators are George A. Cadwallader, Joseph Cawley, F. H. Good, Samuel Hunt, Charles A. High and H. S. Loughry.

Changes in the Allis-Chalmers Co.

(Special Telegram.)

CHICAGO, Ill., Jan. 29.—The statement published in a Chicago paper, that owing to the resignation of William W. Allis of Milwaukee, as chairman of the board of directors of the Allis-Chalmers Co., Chicago, and the election of E. H. Gary, chairman of the United States Steel Corporation as his successor, that the Allis-Chalmers Co. had become allied with the United States Steel Corporation is unequivocally denied by officials of the Allis-Chalmers Co. Mr. Allis retires on account of ill health, and Mr. Gary was elected simply because he was a large holder of the stock of the company, and had taken an active interest in its affairs. Edwin Reynolds resigns as general superintendent, but will continue as chief engineer. Irving H. Reynolds, in addition to the position he now holds, as assistant chief engineer, has been appointed general superintendent of the Milwaukee works. This is in order that Edwin Reynolds might be relieved of the detail of the shops and devote his time to superintending the completion of the company's new works at West Allis, near Milwaukee, which were designed by him. No change in the active management or policy of the company has been thought of. Charles Allis is president and chief executive officer, W. J. Chalmers, chairman of the executive committee and treasurer, and H. W. Hoyt, second vice-president.

New Toledo Blast Furnace.

Concerning the proposed blast furnace project for Toledo we have the following authoritative information: The parties interested prefer for the present that it be simply stated that the project will be backed by iron ore and pig iron interests with ample capital, and that a furnace modern in every respect and capable of producing about 350 tons of foundry and malleable pig iron per day will be erected on one of the three sites at Toledo now under option to them. The definite location will probably be determined in the next two weeks. Details of furnace construction are now being considered.

The first anniversary of the incorporation of the Bowler Foundry Co. of Cleveland was celebrated last week with a dinner, at which 16 stockholders, mostly employes, were present. The company is in a sense a co-operative one, most of the stockholders being molders who were thrown out of work in 1900 by the Cleveland strike. A successful year was reported and the plan of operation was pronounced satisfactory. The officers were re-elected: W. C. Bruce, president; N. P. Bowler, vice-president; F. W. Bowler, secretary and treasurer. Geo. W. Balkwill, engineer, and Chas. Kuntz, Jr., with the officers constitute the board of directors.

COLORADO FUEL & IRON CO.'S PUEBLO WORKS.

A weekly journal, *Camp and Plant*, in magazine form, has been started recently as an adjunct of the sociological department of the Colorado Fuel & Iron Co. The initial number notes that there are 38 coal and iron camps, rolling mills and steel works of the company in Colorado, Wyoming and New Mexico, at which 15,000 men, representing 75,000 people, are employed in digging coal and iron ore and manufacturing coke, iron and steel. The output for the year 1901, December estimated, is as follows: 115,182 net tons of pig iron, 154,564 net tons of steel rails, 12,448 tons of castings, 9,462 tons of spiggeleisen, 104 tons of steel plates, 33,901 net tons of merchant iron, 6,850 ton of iron pipe, 10,716 net tons of spikes, bolts, and nuts, 4,043,530 tons of coal, 554,544 tons of coke, and 352,369 net tons of iron ore.

An article on Pueblo and the Minnequa works of the company in the new journal gives interesting data, from which we take the following:

By far the largest and most important of the many manufactories by which Pueblo is in large measure supported, is the Minnequa works of the Colorado Fuel & Iron Co. Pueblo, a city of 45,000 people, is situated in the central part of Pueblo county, in Southern Colorado, on the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe, the Missouri Pacific, the Denver & Rio Grande, and the Colorado & Southern railways.

A quite rich agricultural region is tributary to the city, but the reduction of ores and general manufacturing are the industries that have made Pueblo what it is. At the extreme southern end of Pueblo, in what was formerly the town of Bessemer, are the steel works. When the mill was first started by the Colorado Coal & Iron Co., in 1881, and, indeed, until recently, it was known as the "Bessemer Works."

Since the Colorado Fuel & Iron Co. got control of the plant it has been greatly enlarged and improved, and at present many millions more are being expended in still further enlargements and improvements. Besides the three blast furnaces at present in operation (the new furnace, *A*, with a capacity of 400 tons of pig iron a day, which was blown in last August, and the two "old furnaces," *B* and *C*, with a capacity of 250 and 200 tons a day, respectively), two new blast furnaces are being built with a daily capacity of 400 tons each. Of these, Furnace *D* will be completed by April, 1902, and Furnace *E* will be blown in during January, 1903. Before the new blast furnaces are completed, and probably within five months, there will be a proportionate increase in the Bessemer steel converter, where two ten-ton vessels will replace the present equipment of two five-ton vessels. The rail mill, when increased so as to handle the increased amount of steel from the converter, has a capacity of 1,200 tons of steel rails a day. In connection with the furnaces for open hearth steel, work on which is progressing rapidly, five new steel rolling mills, with a capacity of 1,000 tons of steel a day will be opened. A structural iron and steel shop is projected. Work is also being pushed on the new wire mill, situated across the railway tracks to the south and east of the blast furnaces. This mill will give employment to 1,500 men, and will have a capacity of 400 tons of all sorts of wire. The mill for plates 72 inches wide and of all thicknesses, from 1¼ inches down, will be completed as soon as possible, and will give employment to 100 men. The tin plate mills, which are now being constructed, will give employment to 700 men and girls. The new foundry will have a daily capacity of 100 tons of castings. Other enlargements and additions are being considered. Although 4,441 pay checks, covering $212,795.26, were issued last week to employes for labor in the Minnequa works during November, at present only about 3,000 men are regularly employed; the large number of checks each month being accountable to the fact that many of the men work at different times in the month in several departments, and many thus work but a day or two. When the enlargements and additions enumerated above are completed, which will not be for 18 or 24 months, between 10,000 and 12,000 persons will be empolyed at the Minnequa works.

J. B. McKennan is manager of the works; R. H. Lee, general superintendent; Fred Darroch, chief clerk; James H. Robinson, assistant chief clerk; E. G. Rust, chief engineer; W. M. Lewis, master mechanic; A. H. Helander, chief draughtsman; J. C. Gambier, chief chemist; R. H. Lee, acting superintendent blast furnace department; Thomas Crowe, superintendent Bessemer and rail department; T. J. Brown, superintendent merchant steel department; John Y. Brooks, superintendent rod and wire department; A. L. Connor, superintendent sheet and tin plate department; J. B. Monahan, superintendent merchant iron department; T. H. Haley, superintendent bolt and nut factory; W. N. Crocker, superintendent pipe foundry; H. A. Case, superintendent yard; J. H. Fenn, storekeeper; George M. Laybourn, official photographer. The appointments to the positions of superintendent of the spike factory, superintendent of the plate department, and superintendent of the open hearth department have not been announced.

The offices of the Minnequa works were moved last week from the old quarters within the "fence," to a large new building to the west and across the railroad tracks from the plant. The piers for a viaduct, that will give easy access to the works from the offices, are now in place. A new laboratory and a mess hall for the heads of departments are being built near the new offices.

In order to supply the steel plant with water, two large storage lakes (Lake Minnequa or Reservoir No. 1, which was made about twelve years ago, and Reservoir No. 2) have been made to the south of Pueblo. A third (Reservoir No. 3) is being constructed. The two newer reservoirs will be unique in that their bottoms and sides will be lined with slag from the blast furnaces in order to prevent seepage.

A number of auxiliary plants will probably be erected in the vicinity of the Minnequa works. The only one at present being built, however, is that of the Steel Wheel & Wagon Co. This corporation, of which Willam H. Schofield is president and general manager; G. W. Bowen, vice-president; S. I. Heyn, secretary, and H. T. Wright, treasurer, is now building its plant on ten acres of ground to the south and west of the Minnequa works. The main building is to be 90x300 feet, and the factory will have a capacity of 5,000 steel wagons a year, and an equal number of minor products, such as mine cars, scrapers, ore buckets, and baggage trucks. This factory will give employment from the first to 200 men.

The Minnequa Town Co., which owns large tracts of land to the south and west of the steel works, is now building a large number of new dwellings, varying in size from four-room cottages to ten-room houses. This Minnequa addition, which overlooks Lake Minnequa (Colorado Fuel & Iron Co. Reservoir No. 1) is to be parked and planted in grass and trees next spring. One thousand new houses, many of which will be disposed of to the 7,000 new employes of the Minnequa works, are projected, and the construction of them will be pushed as rapidly as the material can be delivered. In the plans for all of these houses, particular attention has been paid not only to comfort, but to architectural beauty. Plans have also been made for two hotels in this suburb of Pueblo. Of these, one will be a first-class hotel for transients and will contain fifty rooms; the other, with 200 rooms, will be a well equipped and thoroughly sanitary boarding house for single workmen.

The plant of the Modern Iron Works, located at Aurora, Ill., will be removed to Quincy early in the spring. The company manufactures plumbers' supplies. A large bonus was offered by the citizens of Quincy to secure the plant.

Some 30 pages of a new pamphlet, 3½x6 inches, are devoted to an exposition of the characteristics of the Renold silent chain gear. This device is the invention of Hans Renold, a very ingenious manufacturer who has grafted many American methods upon Teutonic stock and planted them successfully in English soil. The Renold plant at Manchester, England, is justly noted for advanced methods and the chain gear is a very useful product of the shop there. It is now handled in this country by the Link-Belt Engineering Co. of Nicetown, Philadelphia, who publish the present pamphlet These American patents are owned by the Ewart Manufacturing Co., and the chain is being made at their plant in Indianapolis.

The Akron Gear Co., Akron, O., has purchased the machinery, rights and good will of the Holman Gear Co. of Valparaiso, Ind. The machinery of this plant will be removed to Akron immediately and a new building 100x50 feet has been erected.

PRESSED STEEL CAR CO.

The annual meeting of the Pressed Steel Car Co., of Pittsburg, was held last week, when the balance sheet for the year ending Dec. 31, 1901, was presented and directors elected for the ensuing year. Directors were elected as follows: A. H. Larkin, F. N. Hoffstot, J. W. Friend, J. H. Reed, T. H. Given, H. E. Moller, Henry Phipps, G. E. Macklin, and F. G. Ely. The regular quarterly dividend of 1¾ per cent was declared on the preferred stock, and 1 per cent on the common. The annual statement follows:

ASSETS.	1901.	1900.
Prop. and franchises	$25,615,832	$22,605,000
Additions to plant	441,771	.....
McKees Rocks plant	.....	1,581,580
Additions to plant	.....	555,702
Dies and Patterns	.....	272,082
Stocks owned	139,000	.....
Tax ins., not accrued	18,366	.....
Accounts receivable	1,813,596	1,915,768
Materials on hand	4,868,273	4,922,952
Cash	1,301,728	214,035
Totals	$34,228,566	$32,112,119
LIABILITIES.	1901.	1900.
Common stock	$12,500,000	$12,500,000
Preferred stock	12,500,000	12,500,000
First mort. gold notes	5,000,000	.....
Purchase money mort	235,000	235,000
Accounts payable	1,838,791	1,938,519
Bills payable	.....	2,755,000
Accrued salaries and wages	126,987	152,565
Accrued dividends pfd	218,750	218,750
Accrued interest	108,867	.....
Surplus	1,700,171	1,812,285
Totals	$34,228,566	$32,112,119

The foregoing surplus is made up as follows:

	1901.	1900.
Surplus	$ 1,812,285	$ 1,362,104
Deduct—		
Dividends, common	500,000	750,000
Charges pertaining to previous years	521,408	.....
Totals	$ 1,021,403	$ 750,000
Balance	$ 790,882	$ 612,104
Add. profits this year	1,927,925	2,075,181
Totals	$ 2,718,807	$ 2,687,285
Deduct—		
Dep. and renewals	$ 143,635	.....
Preferred stock dividend	875,000	875,000
Totals	$ 1,018,635	$ 875,000
Surplus December 31	$ 1,700,172	$ 1,812,285

President Hoffshot in his statement to the stockholders, said: "In your examination of the balance sheet it will be well to bear in mind that when the company was incorporated it had a cash working capital of but $1,500,000, and at that time was doing a business of but $1,000,000 a month. By reason of the great demand for the company's products, it was deemed wise to more than double the capacity of the plant for the manufacture of pressed steel cars and pressed steel trucks, bolsters, etc., and another plant was installed during the past year for the construction of an entirely new line of work—steel under-framed, wooden-topped cars. The result of this installation has been very satisfactory, and the company is now in a position to bid on the erection of all kinds of freight cars.

"Since the incorporation of the company the profits have aggregated $4,312,285. Out of these profits dividends of $1,750,000 on preferred and $875,000 on common stock have been declared and paid. The McKees Rocks plant cost $1,581,580, and additions for the purpose of acquiring property and making improvements to original plants amounting to $555,702 have been taken out of the initial working capital and earnings. From this it will be seen that the actual cash working capital of the company has been somewhat encroached upon, but the plants and capacity have been more than doubled, and the monthly production increased from $1,000,000 to upwards of $2,000,000. Increased volume of business necessitates the carrying of larger stocks of material and for the full operation of the plants, so far as can be seen, it will be necessary to carry between $4,000,000 and $5,000,000 worth of material on hand at all times, and for this purpose the company has been compelled to be an extensive borrower. During the past year money has been borrowed at low rates, but it has been deemed advisable and prudent to fund this floating indebtedness. Therefore, a mortgage for $5,000,000, covering a period of ten years and bearing interest at the rate of 5 per cent per annum, to secure notes maturing at the rate of $500,000 each year, has been executed, with the right to anticipate payment of all or part, as provided for in the mortgage. These notes have been disposed of at terms advantageous to the company.

"By this means the company secures extra working capital, and its interest charges are limited not to exceed $250,000 the first and $25,000 less every year thereafter. There was disbursed last year for interest and borrowed money $215,821, which was charged off to operating expenses, and we believe that more than the difference appearing between this amount and $250,000 can be saved in extra discounts on materials purchased. The retirement of the notes annually will strengthen the company and reduce its interest accounts. Nothing has been added for appreciation of the company's real estate, which was largely increased in value during the year; and nothing has been deducted for depreciation of plants, for the reason that it has been the custom of the company to charge all expenses for the keeping up and replacing of dies, tools and machinery to operating expenses, and by reason of the practically indestructible character of the plant and properties, their newness and high efficiency, no necessity has arisen to the present time to open a depreciation account. With the company well equipped for the economical handling of its large and growing business, its debts funded at 5 per cent and ample working capital to continue its business, its future seems assured."

Engineers' Society of Western Pennsylvania.

The twenty-second annual meeting of the Engineers' Society of Western Pennsylvania was held at the rooms of the society, 410 Penn avenue, Pittsburg, on Tuesday evening, Jan. 21. Preceding the meeting the past presidents of the society were dined at the University Club by the board of directors. Henry W. Fisher, the retiring president, delivered the only address of the evening. As an annual address it was decidedly unique, inasmuch as it consisted of letters from various governmental departments and large manufacturing concerns throughout the United States, reviewing the most important strides in their lines throughout the past year.

The reports submitted by the secretary and treasurer showed the society to be in a flourishing condition. The membership has grown to 510 during the year, while there is a bank balance amounting to about $1,000.

The election of officers for the ensuing year resulted in the election of the following: Charles F. Scott, president; Chester B. Albree, vice-president; C. B. Connelly, Charles Hyde, directors; Charles W. Ridinger, secretary; A. E. Frost, treasurer. The following were admitted to membership: Charles M. Clarke, patent attorney; Samuel E. Clarkson, construction engineer, Jones & Laughlins, Ltd.; Otto Eisenschiml, chemist, Carrie Furnaces; F. I. Ellis, mechanical engineer, with Frank-Kneeland plant of United Engineering & Foundry Co.; Curtland C. Gardner, contracting engineer, United Engineering & Foundry Co.; C. H. Garlic, mechanical expert, Atlantic Refining Co.; F. H. N. Gerwig, steam engineer, Duquesne Steel Works, Carnegie Steel Co.; Walter Schmidt, draughtsman, Westinghouse Electric & Mfg. Co.; D. Y. Swaty, civil engineer, Pennsylvania lines West; E. J. Taylor, civil and mining engineer, Pittsburg Coal Co.; Frank B. Ward, local manager for the Niles Tool Works Co., Bement Miles & Co., Pond Machine Co. The annual banquet of the society will be held at the Hotel Schenley on Friday evening, Feb. 21.

The Marcy Mfg. Co., Bluffton, Ind., held its annual meeting on Jan. 20, 1902, resulting in the election of the following board of directors for the ensuing year: Wm. C. Elston, president; G. A. Ullman, vice-president; E. V. Livers, secretary; E. L. Murray, treasurer; J. A. Ullman, general manager. The secretary's report shows a great increase in business over the preceding year, and it was decided to increase the company's manufacturing capacity.

Peter A. Frasse & Co., 94 Fulton street, New York, a prominent machinery and supply house, announce that they are the general Eastern distributing agents for the Shelby Steel Tube Co. They are carrying in stock all sizes of tubes from 1-32 to 4 inches, outside measurement.

The foundry of the Tacony Iron Works Tacony, Pa., resumed operations last week. It has been idle for some time and only recently changed hands.

NOTES ON THE BLAST FURNACE.

BY FURNACEMAN.

At one of our modern blast furnaces recently the molten iron worked through the hearth walls under the water pit surrounding the hearth and broke out up through the ground about 18 feet from the columns. The rushing of the iron up through the ground caused a current to run back into the water pit, which exploding tore off all the water connections and wrecked part of the building. The furnace was on a heavy burden and the stoppage having cooled off the furnace, it was difficult to start it. After blow piping and doing all that could be done, the side of the furnace was opened, when it was found that iron had chilled up four feet about the tuyeres solid. The furnace was then dug out. The bosh had bronze bosh plates 30 inches long inserted in the walls about 20 inches apart. Each row of bosh plates was bound by a steel band 1x6 inches. On digging out it was found that all the fire brick of the bosh had melted

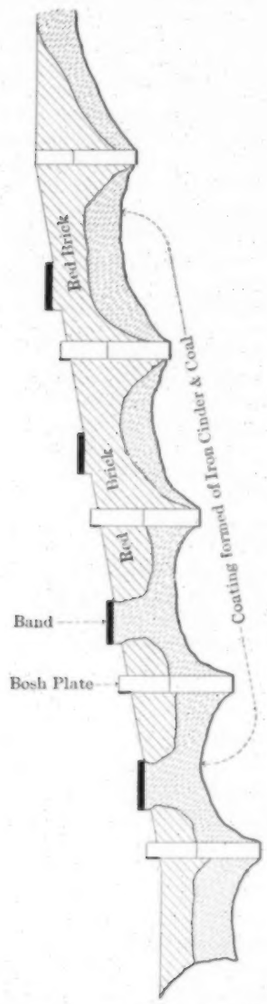


FIG. 1.—SECTION OF BOSH WALL AS BURNED OUT.

away from bosh plate to bosh plate and only 3 inches of the outer course of red brick was left, except at the bands, where the red brick was all gone and a molten coating formed of cinder coke and lime had replaced the red and fire brick.

This coating extended into the nose of the bosh plates, but was melted back from the nose of the plates between them 6 to 8 inches. The bosh had become a series of ridges all the way down the slope, which when using anthracite coal causes slips and irregular working. See Fig. 1. The remarkable thing is the pressure the walls stand without blowing out oftener than they do. In one instance one of our best managers of iron and steel works was burned to death by the walls giving way between the bosh plates and blowing the fuel with the gas over him.

The crucible jacket of the above mentioned furnace was 1-inch plate, 8 feet deep, well riveted. The water pit was 30 inches deep and below it a wall of fire brick was built up solid from the furnace foundation across to the jacket and down to the bottom of the jacket. This wall retained the heat, allowing the iron to melt the jacket away below the pit nearly half way around and 24 inches high. The iron commenced working through the jacket half way around from the place where it broke up through the ground. There are many tons of iron in the space between the furnace jacket and foundations, where this iron made its way half way around the jacket. It is a question what became of the fire brick, which were melted and replaced by the molten iron outside of the jacket. They are not to be found. They may have melted and the iron being the heavier has probably pushed the fused brick into the hearth letting it escape at the cinder notch. Lumps of iron weighing 10 tons have been found in the earth below the surface outside of the dam in old stone stacks, but how they replaced the earth and did not show it is a mystery.

If a stout 10-inch circular pipe had been laid in the brick work below the water put all around the jacket and led to the chimney, the other end being open to allow a current of air to be drawn through the circular pipe, this jacket would have been kept intact and no break out could occur. The hearth and foundation is a large magazine to store up heat which keeps accumulating and getting hotter until the melting point is reached, when the iron jacket melts leaving the fluid iron go where it finds the least resistance. | With the 10-inch circular pipe, after a certain heat is reached, it can get no hotter, as the current of air abstracts the heat and keeps the temperature down. This current of air is at work constantly and in 24 hours abstracts a large volume of heat. It has done well where tried and all danger from water explosions is avoided. If the furnace gets cold and the heat in the hearth runs down, the end of the 10-inch circular pipe can be closed and the heat will be retained. Placing a series of these circular pipes one above the other the water can be dispensed with and explosions avoided. A help in this line can be had by casting the iron oftener, which gives less ferro-static head. To get at the pressure of the iron, the head and the pressure of the blast must be added.

The companion to the before mentioned furnace having been banked for want of fuel, it was decided to start it up. After the blast was on for some time and before cinder got up, a bronze cooling plate at the top of the crucible jacket, which is lower than the tuyeres, exploded and blew out, having been burned by molten iron. This was followed by two more and finally by a fourth one, which blew out the side of the furnace, the tuyere, tuyere breast and tuyere housing going with it. The two bands 1x5 inches holding the housings were torn off. All the bronze cooling plates below the tuyeres were then removed, and the furnace has been going well since. In 1877, a cooling plate above the dam built in the wall blew out and threw molten iron 300 feet from the furnace. In a similar explosion the dam was torn out and the keeper blinded for life. The great number of explosions in the past appears not to have deterred the later builders from placing coolers in the wall below the level of the tuyeres. Sooner or later iron will get at them and cause explosions with loss of property and life. External cooling with water is the only safe method at that point.

These currents of iron are peculiar. They come from currents of air finding their way through the fuel and starting melting above the tuyeres next to the walls. The currents of iron running down impinge on the tuyeres and coolers melting them and causing explosions or letting water force its way into the hearth. In one case a large trough resting on the offset of brick work below the tuyeres outside of the tuyere breast was cut through from below, while the trough was full of water. A current had got dammed up inside and in circulating cut up through the trough. So long as the iron is prevented from circulating or moving there is no danger.

On one occasion at a large modern furnace the iron notch was stopped and shortly afterwards the iron melted a hole through the 5-inch cast iron jacket between the coils which were cast in it. The hole was 3 feet around from the notch. The iron ran into the water pit and the explosions that followed shook the neighborhood. These explosions tore off the

water connections, but fortunately no life was lost. The currents of air find their way to distant parts of the hearth when a furnace is not working well and start combustion where it is least expected. When the air current is once established the falling drops of cinder and iron form a pipe or channel to pass the blast along. They are known to pass from one tuyere past the nose of the next tuyere and blow out through the cinder notch. These conditions are to be had only on a furnace working cold in the hearth or a cold blast furnace. During this bad working a piece of the scaffold sometimes comes down near the tuyeres, leaving a space above the tuyeres. The cinder collecting above the piece of the scaffold pours down over the edge of it or finds its way through it in a current. On watching this current through the eyesight it looks like a large black snake sliding down. The cinder coming in contact with the entering air is chilled in sliding down, and in compariosn with the bright heat in the hearth makes the current look black. Old founders call them "black snakes," and have no love for them.

The writer, while worrying over a sick furnace 26 years ago, noted in his book: "Heat! Heat!! Heat!!! It must be obtained and maintained in the hearth for successful furnace work."

PERSONAL.

At the annual meeting of the Pressed Steel Car Co., held last week at New York, William H. Schoen resigned as first vice-president and director.

Several changes in the management of the Braddock and Rankin, Pa., plants of the American Steel & Wire Co. were announced last week. Walter L. Stone, general manager at the Rankin plant, has been appointed assistant superintendent of the Chicago district. August Mann, the present superintendent of the Braddock plant, will take charge of the Rankin mill, and he will be succeeded by James G. Mustin, the present chief clerk at this plant. Peter Crane, foreman of the nail mills at the Braddock plant, has been appointed assistant to Mr. Mustin.

James E. Simons, superintendent of rolling stock of the Pittsburg Coal Co. of Pittsburg, has been appointed general manager of the Pittsburg and Moon Run Railroad.

W. A. Cornelius, who has been the general superintendent of the National Rolling Mill, Monongahela Furnaces, and Boston Iron & Steel Works of the National Tube Co., has been appointed assistant general manager of these plants by the board of directors of the company.

Guy R. Johnson, recently superintendent of the blast furnace of the Sharon Steel Co., Sharon, Pa., has resigned to accept a position as blast furnace superintendent at Joliet, Ill.

John K. Bryden, a member of the firm of Darr, Luke & Moore of Pittsburg and New York, has been elected to the board of directors of the Sharon Steel Co., Sharon, Pa.

A reception was tendered Percival Roberts, Jr., of the American Bridge Co. at the Pencoyd Club, Wissahickon, Pa., by the employes of the Pencoyd Iron Works on Saturday, Jan. 18. Mr. Roberts is now chairman of the executive committee of the American Bridge Co. A testimonial volume was presented to him at the reception, commemorating his 25 years of service at the Pencoyd works.

H. R. Barnhurst, formerly connected with the Erie City Iron Works at Erie, Pa., has been appointed superintendent of the Milwaukee, Wis., plant of the Allis-Chalmers Co.

B. H. Warren, first vice-president of the Westinghouse Electric & Manufacturing Co. of Pittsburg, Pa., the executive officer of that concern, resigned last week at a meeting of the board of directors. F. H. Taylor, fourth vice-president, was elected to fill the vacancy. L. A. Osborne, general manager of the East Pittsburg works was elected fourth vice-president.

Charles Lutz, superintendent of the wire mill of the Sharon Steel Co., Sharon, Pa., has resigned to accept a similar position with the National Steel & Wire Co. at Joliet, Ill.

W. K. Smith, for many years connected with the civil engineering departments of the Carnegie interests, with headquarters at Pittsburg, has tendered his resignation to become effective Feb. 1. He will practice as consulting engineer in Pittsburg.

George A. Chalfant, who retired from the Spang, Chalfant Steel Co. on Jan. 1, was called upon in an impromptu way at his home in Pittsburg last week by about 60 of the oldest employes of the firm. Mr. and Mrs. Chalfant leave for a tour of Mexico on Feb. 1.

The resignation of F. H. Buhl of Sharon, Pa., as director of the Sharon Steel Co., was accepted last week.

Erskine Maiden has resigned as master mechanic of the Bessemer plant of the Republic Iron & Steel Co., Youngstown, O. He has accepted the position of chief engineer under the master mechanic at the Ohio plant of the National Steel Co.

W. A. Kingsley has resigned as sales manager of the American Steel Hoop Co., with headquarters at Youngstown, O. B. E. Hamilton has been appointed his successor.

F. H. Miller has resigned as manager of the Marting steel plant operated by the Columbus Iron & Steel Co. at Columbus, O. H. A. Marting was chosen Mr. Miller's successor. Mr. Miller resigned on account of ill health.

L. E. L. Thomas has been appointed assistant chief engineer of the Republic Iron & Steel Co. with headquarters at Youngstown, O. Mr. Thomas has held a similar position with the Dominion Iron & Steel Co. of Sydney, Nova Scotia.

Obituary.

Charles Paxton Williamson, organizer of the Williamson Iron Co. of Birmingham, Ala., died at his home in Birmingham Jan. 20 in his 59th year. Mr. Williamson was one of the pioneer iron manufacturers of the South, and was one of the first to recognize the possibilities of the Birmingham district as an iron-producing center. He was born in New Richmond, O., Jan. 11, 1843. At 15 he went to work in the shops of the Louisville, New Albany & Chicago Railroad Co. at New Albany, Ind. In 1861 he enlisted and was made a second lieutenant, serving for a year in the Army of the Potomac. Later he was employed by a firm engaged in architectural iron work. Going to Birmingham in 1874 to carry out a contract for iron construction, he accepted the position of superintendent of the Birmingham Foundry & Car Mfg. Co., now the Linn Iron Works. In 1879 he built the Jefferson Foundry, and in 1885 organized the Williamson Iron Co., which built a blast furnace. The foundry was merged in the same business.

Chester Griswold died at New York on Thursday, Jan. 23, of apoplexy. He was a brother of John Wool Griswold, of the Dillon-Griswold Wire Co., Sterling, Ill., who died on Jan. 2 at Chicago, and on Jan. 15 had been elected a director of the latter company, to succeed his brother. He was a director of the Adirondack Railway Co. and the Hudson River Ore & Iron Co., and a member of a number of New York clubs. He was born at Troy, N. Y., Sept. 10, 1844, and was the son of John A. Griswold, for 25 years a representative citizen of that city. The Griswolds came originally from England, Edward and Nathan settling at Windsor, Conn., in 1639. Mr. Griswold's father, John A. Griswold, in 1861 in connection with C. F. Bushnell and John F. Winslow, built Ericsson's Monitor, and assisted in the construction of a number of other vessels of the monitor type.

Schniewind Coke Ovens at Sharon, Pa.

The United Coke & Gas Co. of New York has closed a contract with the Sharon Steel Co. of Sharon, Pa., for the erection of 212 Schniewind ovens. The daily capacity of the plant is as follows: Coal carbonized, 1,696 net tons; blast furnace coke produced, 1,272 net tons; total gas output, 15,264,000 cubic feet; surplus gas output, 6,784,000 cubic feet.

Walter L. Flower & Co., Chemical Bldg., St. Louis, Mo., reports that the demand for Acme oil filters for the past 60 days has been greater than at any time in the history of the business. Through one of the largest refining companies of the country, the manufacturer has exported to Japan within the last two months 22 of these filters. The same concern, for its domestic trade, also ordered 12 filters within this period. In addition, the company has sold fully an equal number to other concerns.

The Evans furnace of the Reading Iron Co., Reading, Pa., was placed in operation last week.

Improvements in Explosive Motors.

The automobile is deserving of a good share of credit for the more recent developments in gas engine design. The requirements of road service have been rigorous, and the designer of the propelling machinery has had a problem set for solution of an extremely puzzling character. The steam engine has many advantages in this particular field, and it is not surprising that the motor propelled by steam has had a very lively vogue in motor-vehicle development. The common knowledge of the motive power has been a strong factor in the introduction of the steam engine in this industry, and the peculiarly elastic character of the outfit has offset some of the disadvantages apparently inseparable from that type of machine.

A steam boiler is in reality a storage battery, the stored-up energy being ready for utilization at any increase of the average demand for steam. The situation is thus favorable to the machine which is alternately passing over rough and smooth stretches of road and up or down grades of various angles and conditions of surface. The objections to this type are obvious, nevertheless, and nothing but the equally weighty advantages would have permitted the steam-actuated motor to hold so important a position in the motor-vehicle industry during the few years past in which inventors here and abroad have been busy on the practical solution of mechanical traction upon common roads.

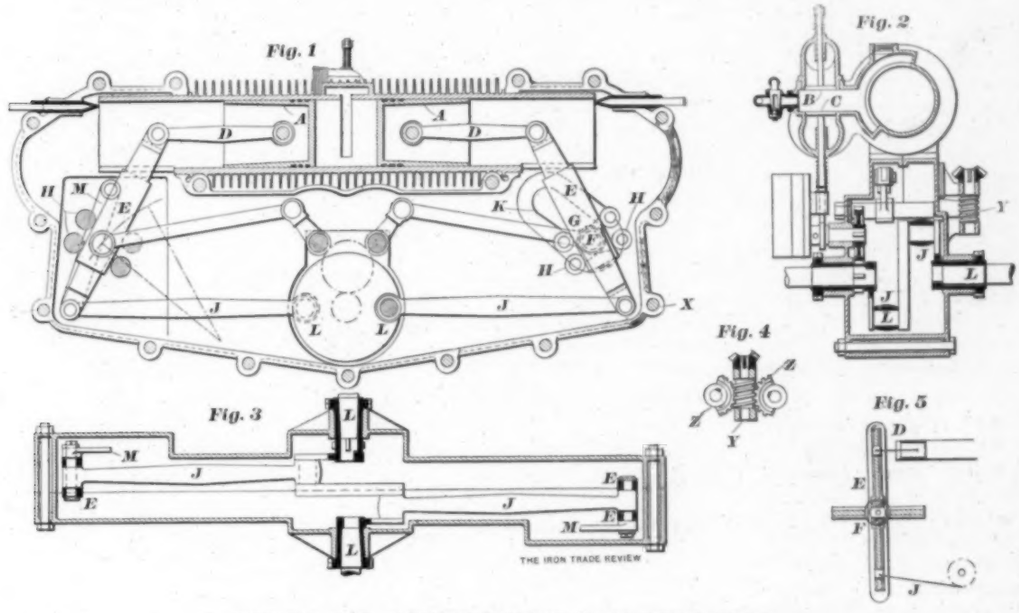
During these years of experiment with the adaptation of the motor-vehicle to present day needs, the explosive motor has been a very alluring subject of investigation. It suggested a ready combination of engine and boiler, the incorporation of the cylinder with the shell of the generator; and the simplicity of the device was highly attractive to the designer, who had to bring the propelling mechanism within convenient limits as to size and complication. Even if the contrivance when completed should lack the flexibility of a more complex machine the appearance would be likely to prejudice the spectator in favor of the simpler arrangement. In practice, however, the gas engine demanded an added range by the use of gearing, the possibilities of variation by changes in the instant of ignition at different parts of the stroke being soon reached. There is a waste in this arrangement for proportioning the power to the load that has some weight, though the general advantages of the gas engine are usually sufficient to outweigh that consideration.

The variation between the motor and the wheels may be obtained in several different ways. The motor may be geared to the rest of the mechanism by cone pulleys, either stepped or taper, and belting. The original Duryea motor carraige had belts and could be brought into working contact by means of jockey pulleys. The machine was slowed down as an up grade was encountered, in order to favor the motor. Spur gearing may be used for a similar purpose, of course, and several nests of gears have been patented permitting this alteration of the mechanical advantage at the expense of the speed, or vice versa, as may be required by the conditions of travel.

French Progress in Motors.

It is not now the intention to examine the many expedients that have been proposed for the purpose in this country, but to mention briefly the most notable that have been brought out in France. The French have certainly succeeded in bringing the automobile industry to a remarkable degree of attainment. Their work is not comparable, so far as the opinion of the writer goes, with that of the leading manufacturers here, but they have evidently lavished an amount of energy in the production of working machines that elsewhere was balanced by mere company promotion.

One of these change-geared connections of the motor and the driving wheels is the design of M. Megy, an inventor of various devices pertaining to elevators and friction clutches. The object of this automatic change gear is evidently to reduce the operation of a motor car to the simplest expression, and the essential features of the speed control are handled with the aid of a special mechanical governor. The steering wheel is mounted on a pillar which is hinged in the center. Assuming the operator to be in his seat and the motor turning with everything ready for a start, the steering pillar is pushed ahead and the car starts, the motor being in gear with the first speed. As soon, however, as the engine regains its normal speed, which has been slowed up by the starting of the car, the second speed gear is thrown in automatically; and this is followed by the third and fourth similarly, as the speed of the engine increases, without any additional movement on the part of the operator. It is not very easy to describe the operation of the mechanism without complete drawings of the device, and these are not yet at hand. The motor, which has a separate governor independent of the movement necessary for the starting and stopping of the car, is always in gear with a pinion on the first-speed shaft, but this pinion is free to rotate and drives the first-speed shaft only when an expanding friction band places it in contact with a dished disc keyed to the shaft. On the first-speed shaft are four other pinions always in mesh with corresponding pinions on the second-speed shaft and giving the four different ratios corresponding with the four speeds. Each of these four pinions is free on the first-speed shaft and has its dished disc to connect it by friction to this shaft. There is an extension of the first-speed shaft wth a sixth pinion meshing into an intermediate gear, which in turn drives a fixed pinion on the second-speed shaft through a friction disc. This com-



SECTIONAL PLAN, ELEVATION AND DETAILS OF RUDDIN ENGINE.

bination constitutes the reverse motion. The first-speed shaft is hollow and contains a sliding bar, which, as it advances, connects the friction gear in each of the four discs successively. There is a second governor on the motor which presses forward the sliding bar in the interior of the main or first-speed shaft as the engine increases in speed or draws it back as the motor slows down. It will be seen, therefore, by following the description that the first movement of the steering wheel sets the first-speed shaft in motion and then, as the speed of the motor increases, the sliding bar is pressed forward until the fourth speed is reached. This is, of course, on the assumption that the conditions are favorable, as when traveling along a level road. Should a hill be encountered, however, and the motor slows down, then the bar slides back automatically, the third or next slower speed comes into operation and the gearing within its limitations is thus capable of adjusting the motor to the requirements of locomotion.

There is necessarily a limit to the number of gears, and that point is soon reached when four or five changes of speed have been attained. The passing from one speed to the other is thus an abrupt transition, the magnitude of the shock being dependent upon the number of the gears and the difference in their speed ratios.

Internal Combustion Motor with Automatic Adjustment.

There is another way in which this purpose may be obtained with a more gradual action, the avoidance of the violent speed changes inseparable from the ordinary combination of speed gears. The problem is on the same lines, in fact, as the water pressure in a hydraulic motor. The work to be performed at each stroke may be very different at various times and yet the amount of pressure water used—that is the energy—is the same, so long as the stroke and diameter of the motor remain constant; but there is a possibility that the two—load and energy—may be mutually adjusted by some different construction of the machine. One method of remedying this evil is to shorten the crank as the work being done is diminished.

This is the germ of the two inventions selected for illustration in this connection.

The engravings, Figs. 1 to 5 inclusive, show a recent embodiment of this idea patented by M. A. Euddin of Paris; the inventor claiming a design for an internal combustion motor which can adapt itself automatically to varying conditions and exert efforts proportional to the work required. Fig. 1 is a longitudinal section of the motor by a plane passing through the axes of the cylinders. Fig. 2 is a cross section of the same through the axis of the driving shaft. Fig. 3 is a longitudinal section of the motor along the line X-X in Fig. 1. Fig. 4 shows a detail of the adjusting and locking mechanism. Fig. 5 is a diagram showing an alternative development of the same invention. The motor shown works on the four-cycle plan; the single cylinder having two pistons. During the suction period the pistons A A move to right and left away from each other; the suction of the inlet valve B (Fig. 2) opens automatically by the partial vacuum in the cylinder, and the explosive mixture enters. The pistons execute their inward stroke during the second period and compress the volume of explosive mixture previously admitted. An electric spark ignites the explosive gases when the pistons have neared each other, and the third cycle of operations commences by the outward stroke of the pistons; and lastly, during the fourth period the pistons again approach and the spent gases are expelled through the valve C (Fig. 2), which is raised by a cam at every second revolution of the crank shaft. During the working stroke (using this convenient term to distinguish the active cycle from the suction, compressing and scavenging periods) each piston A acts through its rod D on a lever E. The latter oscillates about a pivot F, which turns in the slider G, and works between the rollers H. The motion is thus conveyed to a connecting rod J coupled to the disc crank L so that the latter receives its impulse simultaneously from the two pistons A A.

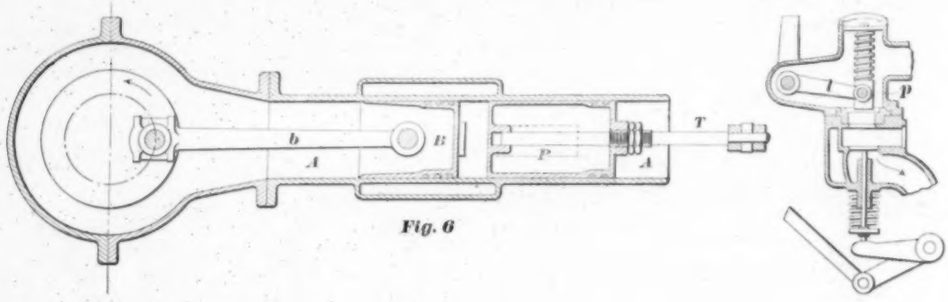


Fig. 6

Fig. 8

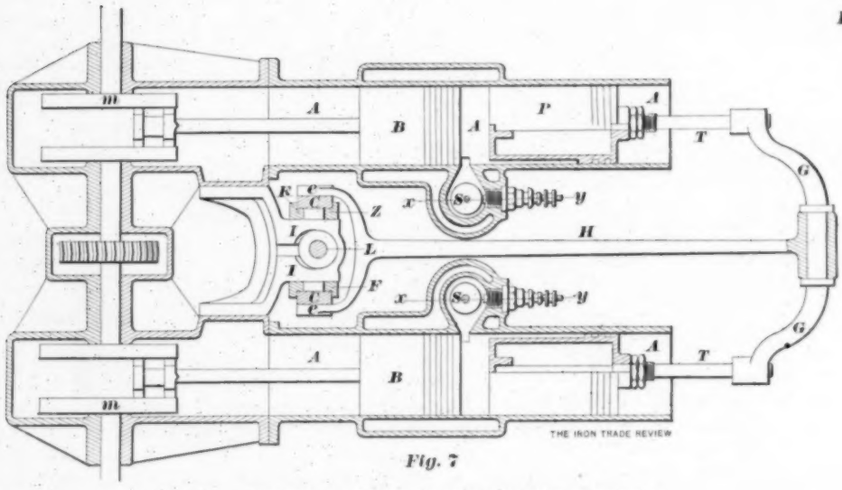


Fig. 7

SECTIONAL VIEWS OF THE MARMONIER ENGINE.

The inventor says that as the two pistons have the same diameter they will receive the same pressure, therefore the efforts exerted upon each are equal and the motor will work without vibration. This is evidently to be qualified somewhat, as the action is not wholly balanced, even when the cylinders are equal in dimensions and are placed in opposition, as in this instance, both pistons are so connected to the crank disc that at every working stroke there is an impulse tending to rotate the motor about the shaft and in the opposite direction to that in which the latter is moving.

The point is not of great importance, perhaps, but the double cylinder motor has so frequently been extolled as capable of removing the unpleasant vibration incidental to a single piston gas engine that it is worth while to suggest that

this may not be accomplished by simply opposing the pistons at 180 degrees.

The two oscillating levers E, being conected to the arms M, which determine their position and prevent them from being raised or lowered, the lower ends of the levers will move always on the same line and have the same length of stroke. Therefore if the slider G is moved in the grooves K, the pivotal point of the levers E will be changed and the upper ends of the oscillating levers will have a stroke varying in length according to the position of the slides G; so that when the sliders are lowered the pistons will have a longer stroke and when the sliders are raised the pistons will have a shorter stroke. The compression in the motor is intended to be constant, whatever may be the stroke of the pistons.

In order to obtain this result it is necessary that the shorter the stroke of the pistons, the smaller must be the area of the combustion or compression chamber. The position of the pivots F to give this result has therefore to be found experimentally. The location will be in an arc of a circle and the groove K is so arranged that the center of the pivot F follows this arc. The radial lines for the arc are shown in dotted lines on the lower left-hand corner of Fig. 1.

The linear speed of the pistons depends upon the size of the admission and exhaust openings and of the average pressure to which they are subjected. The size of these orifices is, however, constant. And since the average pressure depends upon the degree of compression, and, as the latter is uniform, the average pressure is also always constant. It follows, therefore, that the linear speed of the pistons is constant whatever theri stroke may be, and sonsequently the

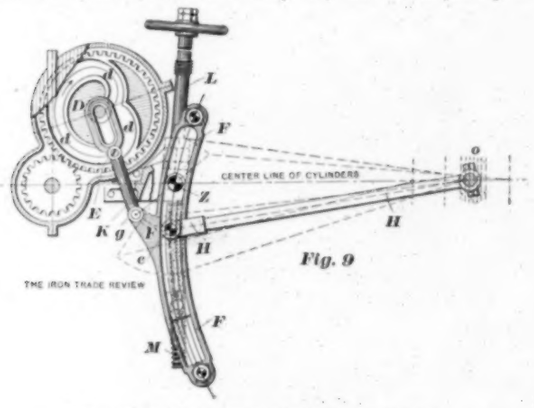


Fig. 9

LINK MOTION OF THE MARMONIER ENGINE.

number of piston strokes in a given time is inversely proportional to the length of the stroke—i. e., the greater the length of the stroke, the less will be the number of strokes in a given time, and the less the number of rotations of the motor shaft; while the shorter the length of stroke, the greater the number of strokes and the more rotations of the driven shaft. The speed of the motor shaft L must not be confused with the linear speed of the pistons. The former is variable, the latter constant. Thus the power of the motor is uniform; the work is equal to the effort multiplied by the distance of travel, and the linear speed and the average pressure being constant the work is also uniform. The diagram shown in Fig. 5 will be understood as having points in common with the other arrangements; the parts with a similar purpose having the same reference letters.

Features of the Marmonier Gas Engine.

Another French expert, M. Marmonier of Lyons, has designed an explosive motor of a similar type, which has been illustrated in *La France Automobile*. The elasticity of the motor is such that when the power of the motor is varied in order to regulate the speed of the vehicle, these results may be obtained without sacrificing complete combustion. The purpose of the designer being to produce a motor capable of turning slowly without loss of strength and possible also of increased speed with no disproportionate consumption of gas. Fig. 6 is a longitudinal section through the axis of one of the twin cylinders shown in sectional plan in Fig 7. The inlet and exhaust valves are shown in Fig. 8. This view being a section along one of the lines x—y in Fig. 7. Fig. 9 being an elevation of the peculiar link motion. The two cylinders A A are parallel and open at each end. They are fitted with pistons B B, connected to the motor shaft by the rods b and the cranks M in the ordinary manner. The opposite end of each cylinder from the crank is closed by supplementary pistons P P, which are coupled by the roads T T and a rigid connecting arm or stirrup G. The crank shaft carries a pinion which meshes with a spur gear of twice the diameter to operate the distribution in the usual four-cycle style and on exactly the same principle as the gears shown in Fig. 2. The half-speed gear D in Fig. 9 has on each of the sides a cam groove d which operates the rolls E. These in turn through the connecting rods K, control the slotted link F and oscillate it about the fixed pivot Z. There is a regulating shaft at L terminated by a long screw M. The screws actuating the movable block which slides in the guides of the slotted link. This is in brief a general description of the important parts of the invention.

Presuming that the piston is at the commencement of the stroke; admission takes places. The cam d moves the rolls E, causing the link F to have an oscillation from right to left. Should the sliding block be so placed that the connecting rod H is in line with the axes of the cylinders, then the auxiliary pistons P P will remain stationary. In such a case the total admission of gas will be equal to the volume displaced by the pistons. If the sliding block, however, occupies a lower position in the link, as for example, the position shown in Fig. 9, then the connecting rod H will force the auxiliary pistons into the cylinders as the main pistons continue the admission stroke and less gas will, of course, be admitted and, furthermore, the admission will be the more reduced as the sliding block is placed lower in the link. This will continue to a stage where the block is at the lowest point and the admission of gas will be at a minimum. On the other hand, when the block passes above the axis of the cylinders the link receives an oscillation in the opposite direction in moving about the pivot Z. The auxiliary pistons move away from their neighbors as the position of the sliding block permits, with the effect that the auxiliary pistons draw in a quantity of gas to be added to the amount obtained by the normal stroke of the main pistons. During the second cycle comparison the rolls E continue in motion with the cam d; the slotted link oscillates from left to right and the auxiliary piston returns to the starting point. The last two cycles, expansion and expulsion of the gases, are passed normally; the rolls E moving in the cylindrical position of the cam d, and therefore the link F and the auxiliary pistons remain immovable.

If we suppose the auxiliary pistons advance toward the working pistons so much that the space between them will be less than normal, then it will follow that the products of combustion remaining at the end of the expulsion stroke will be less, the admission will be lessened, while the compression remains the same because the decreased volume of gas is enclosed in a proportionately smaller space. The composition of the mixture and the compression remain the same in the various adjustments.

When the sliding block is placed above the level of the pivot Z and the auxiliary pistons move in an opposite direction; the admission is increased and the compressed gases are enclosed in a larger space in exact proportion. If the sliding block occupies the lowest position there is no admission; the auxiliary pistons following their mates closely and thus rendering the admission stroke useless. The auxiliary pistons are flatted on the side, as indicated in Fig. 7, in order that the inlet part may not be cut off when the sliding block is in the lower part of the link and the auxiliary pistons are following B.

The link in the Marmonier motor is analogous to that of the reversing steam engine; it is the principal organ of distribution, regulating the movements of the auxiliary pistons and reducing or increasing the quantity of fresh gas admitted, as well as augmenting or lessening simultaneously the compression chamber.

The devices do not lack ingenuity and a nice appreciation of the peculiar problems incidental to the application of the explosive motor to road locomotion. The effort to have the delicate adjustments independent of the operator are of special interest, as the machine must, so far as possible, be self-regulating. The complexity of the devices is a severe tax upon the introduction of any improvement and it does not

seem likely that these highly ingenious machines will supplant the present simple form of explosive motor without some radical modification. This opinion has not interfered with a careful enumeration of such advantages as might fairly be claimed for these inventions and the writer has endeavored to place their merit as prominently as possible. There would seem in practice, however, to be great difficulty in the maintenance of closely-fitting joints and the numerous connections with modern high compression would be likely to give trouble. The intention is well enough, nevertheless, and the object may yet be attained in less complicated fashion. R. I. C.

AN INTERESTING JOB ON THE SHAPER.

The Gould & Eberhardt Works at Newark, N. J., recently handled a shaper job in an interesting way, the work being performed with the regular appliances belonging to shapers of this make. Shortly before the official test of the Holland torpedo boat "Fulton" at Greenport, L. I., the machinery was disabled by the breaking of a steel pinion. This pinion was 6.4 inches outside diameter and 5¼ inches face. A forging was at once made, and in 24 hours the new blank was bored and turned. The following noon the blank reached the Gould & Eberhardt shop, and in less than 24 hours thereafter the new pinion was completed and the "Fulton" was enabled to make a successful trip according to the original schedule, the boat remaining under water some 15 hours.

The pinion was somewhat out of the ordinary type. The two sides were unlike, and the peculiar measurements of the bore were not favorable to an expeditious piece of work. The gear was on the end of a short hollow shaft with a bore only 1⅛ inches in diameter, while the hole in the pinion was 2¾ inches, and it was necessary to cut a keyway through the latter.

The first intention had been to cut out the keyway with a chisel, but this tiresome process was avoided by the following method: The pinion has a hub, 4 11-16 inches in diameter, extending 2 3-16 inches beyond the end of the gear, and the 2¾-inch bore of the pinion goes some 13-16 of an inch into this projection. The hub and shaft are seen in Fig. 1, which shows the pinion held in the vise of a 24-inch Gould & Eberhardt shaper. This extension of the bore into the hub permits the drilling of a hole between the end of the gear and the bottom of the hole, and this allows the tool to have the necessary clearance and at the same time have a keyway equal to the length of the pinion face, a condition which happened to be an essential requirement. A piece of 1⅛-inch shaft served as a cutter-bar, this shaft fitting in the hole through the hollow shaft end of the work. The other end of the cutter-bar was held in a taper bushing fitted to the hole in the apron in substitution for the regular tool post. The apron, or clapper, was held rigidly in place by gib screws to prevent the lifting of the tool upon the return stroke of the ram, and this, together with the support given the outer end of the cutter bar in the small hole of the hub, ensured a smooth, steady cut, and the job was finished in a comparatively short time. A piece of mushet steel was inserted as a cutter in the middle of the bar and secured by means of a set screw. The depth of the feed was increased by simply tapping the tool slightly as it was withdrawn from the work.

The vise grips the work in the usual manner, but the construction of the Gould & Eberhardt vise allowed the use of two bolts and straps on either side of the pinion, at the front and back ends. The vise has two T-slots along the center of the ways, on each side of the screw, into which the heads of standard bolts are inserted and the work clamped down by straps, nuts and washers. This improvement is best shown in Fig. 2, where a regular piece of shaper work is in position clamped in this way. A small job may yet be too large for insertion between the jaws of the vise, and this construction permits the piece to be clamped on the ways after closing up the vise jaws. There are occasional pieces of work where a job of angular planing may be essential and this, can be got at readily with the aid of the graduated base; but if this were to be placed on the saddle and the vise removed the task would not be so convenient.

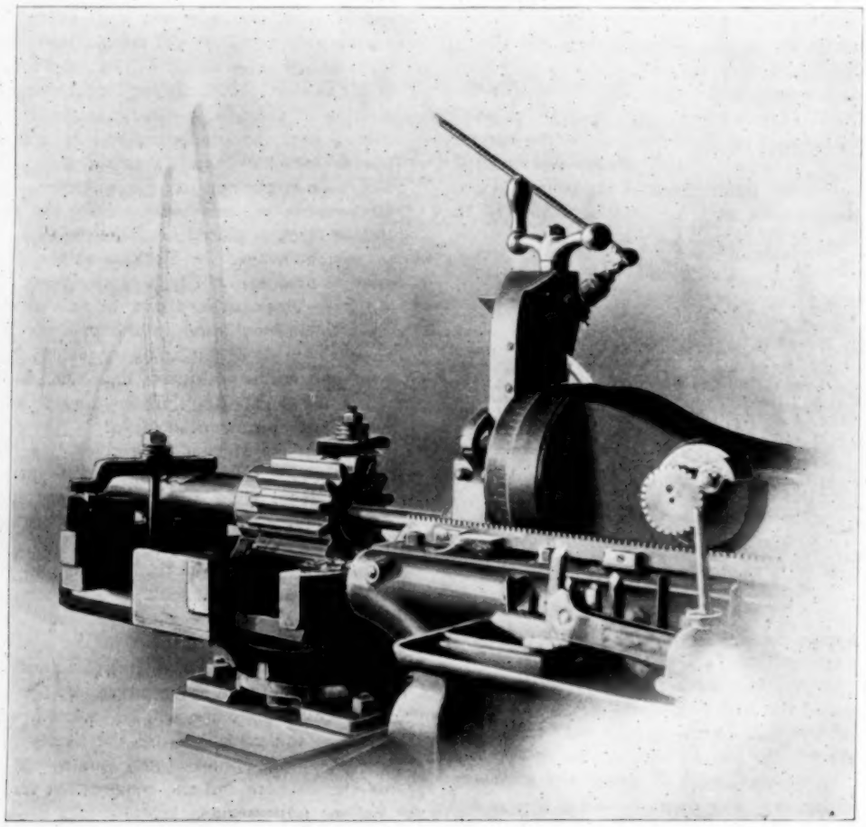


FIG. 1.—METHOD OF CUTTING KEYWAY ON GOULD & EBERHARDT SHAPER

Richards Bros., Knoxville, Tenn., will erect a foundry in connection with their plant for the casting of mine car wheels. Machinery and mining supplies are now manufactured by this concern.

ENGINEERING PERIODICALS AND THE CARD INDEX.

[Extracts from an address delivered at Sibley College, Cornell University, by H. Wade Hebbard, professor of mechanical engineering of railways, Ithaca, N. Y.]

Among the most valuable members of the engineering profession today are the moving spirits of the engineering press. Much matter of great value is regularly to be found in the current periodicals of a profession growing so rapidly and in so many directions as is mechanical engineering. Books, monographs upon particular subjects, necessary as they are by their gathering within one cover all the required material of years and many places, and by their orderly classification, logical discussion, and evolving of principles, are, by very necessity of their production, always and inevitably behind the times. The reason for existence of the engineering press is to collect all recent valuable information—news, if you please—and present it weekly or monthly, less or more digested, to as large a circle of readers as possible. The American papers, representing special branches of the profession, far surpass in numbers and variety and excellence the like papers of the old world. Their general use proves that they have a most important place. With these may be grouped the published transactions of the many engineering societies and clubs. Unthinkingly or deliberately to neglect forming acquaintance with so great a source of engineering knowledge is not fitting for the student who has his own future to make in a country where ruts and old fashions are only for the failures. Should one read, and preserve what he reads? To take knowledge into one's hand temporarily, and then not afterwards have that knowledge available for desired use, is as foolish as once to have seen a life preserver and not be able to find it at midnight collision.

But what of that dimly remembered life preserver which could not be found when there was dire need? Editors of papers, engineering and otherwise, are frequently in receipt of letters like the following: "A number of months ago I read an article in your paper, or one like it, bearing upon such-a-subject. At the time of reading I recognized its value. Not only did I think that I had its essential items impressed upon my memory, but I recall making some record in my note-book. I find now a problem has come up in my practice for which I greatly need, and at once, the information contained in that article, but I can find neither it nor my note, the latter being evidently hidden in the midst of other material. If it appeared in your paper, will you give me the date and if possible send me the copy? I am willing to pay a good price for it." Even when one has the annual indexes of his engineering papers bound up with the volumes, it may be a search of hours to unearth an article whose general subject or whose most valuable details are more strongly impressed upon the memory than its title as appearing in the index. The average subscriber does not get the full value out of his paper, because of this very inability to find again what he has read.

The card index will obviate the difficulty, giving ready access to what has been read by its maker, recording information in the form best adapted to his professional needs and to his own peculiar habits of mind and memory, and following his own pet system. The speaker gave up the note-books ten years ago and commenced a card index, or, as it is sometimes called, "Index Rerum" (Index of Things), making it really a written memory of everything which "might come in handy some time"; of reading, of experience, of oral information; engineering, household, athletic, religious; references to catalogues, drawings, clippings; lists, future plans, addresses—everything.

The mechanical features of a card index are first the cards. These are of white Scotch linen ledger, very tough, technically known in the trade as 19x24-44, a ream of 19x24 inches sheets weighing 44 pounds, like very heavy letter paper. A thicker card will not give flexible handling, and is too bulky. A thinner card is not durable and works up out of place unless held in by some locking rod passed through all the cards. The convenient size of card is about 3x5. It is very essential that all cards in one index be exactly alike in the smaller vertical dimension. To test this, in buying a pack, remove one-half and reverse it to bring the outer cards next to the middle ones; these must then be of the same height, uniformity in the long dimension not being so important. In fingering the index, it is almost impossible to catch a low card between two high ones.

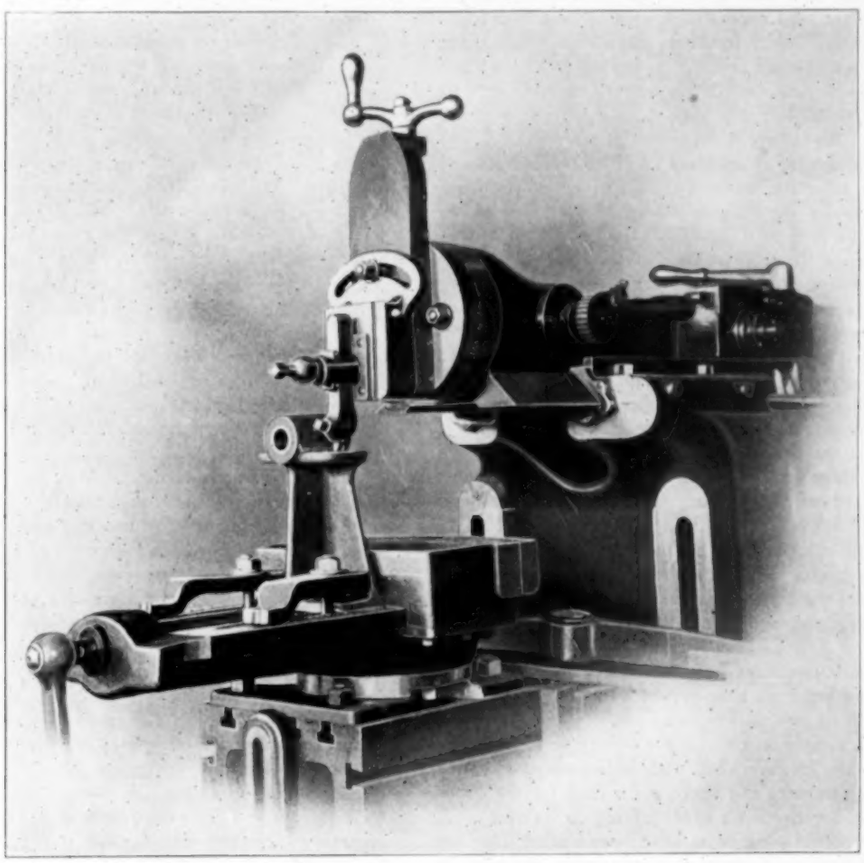


FIG. 2.—METHOD OF BOLTING WORK DIRECT TO WAYS OF VISE ON GOULD & EBERHARDT SHAPER.

Guide cards or heading cards are needed, at first only for one alphabet. These cards are much thicker and tougher than the others, because of greater handling. The student may cut and letter these for himself out of calendar backs or other cardboard, or they may be bought, with letters upon them on a small portion projecting ¼ to ⅜ inch above the common cards. As one's card index gets large along some special line, guide cards may have that subject placed upon the projection, and a following series of smaller-projection alphabetical supplementary guides inserted to subdivide that particular subject for easier reference. One will not err on the side of having too many guides in a large and much used card index. They greatly increase speed of reference.

The cards may be kept in a pasteboard envelope box for a few years. A beveled block of wood may be placed at the back of the pack, to keep the cards slightly fallen back out of the vertical position. This will render the projecting letters more visible.

The making of a card index is a growth. The easiest way to get started is to read the papers with slips in hand and fountain pen or indelible pencil (ordinary purple copying) ready for use. Read an important article. At the top of a card place the subject of the article, very likely not the author's title of the article, but the subject that appeals to your type of mind after the reading. Right here is the most difficult part of a card index. You are in danger of indexing an article on compressed air under C the adjective, when it should be under the noun A; or blowers under B, when it should be under A as air blowers. Perhaps the most accessible guide for the inexperienced indexer is the table of contents of Kent's Mechanical Engineers' Pocket Book, which every Sibley man must, of course, own. On page 447 of the American Society of Mechanical Engineers' Proceedings for 1896, a discussion on card indexes, Mr. Kent explains his method of general heads; *e. g.*, to put everything relating to steam under Steam, as steam boilers, steam engines, steam pipes. The railway mechanical engineer should follow the car builders' dictionary, and the index of the Master Mechanics' Association on page 67 of the proceedings for 1900, to be revised by a special committee for the proceedings of 1901. The Dewey decimal system, as expanded for engineering,was advocated in A. S. M. E., 1893, page 780, though the secretary of the A. S. M. E., in the proceedings for 1896, page 423, shows its limitations and recommends a different system as used in the library of the society and the engineering library of the Franklin Institute of Philadelphia.

Sometimes one is uncertain how to index some piece of information. Remember then that almost everything will have two parts—the thing and its function; and if the thing is the more prominent, catalogue it under the thing; or if the function, then under the function; but, and the following is called "cross-indexing," be sure and make out a card for the other and write on it: See the main card (giving its subject). A liberal use of cross-indexing is no fault; one's mind does not always work on the same lines, and data might be buried even in a card index. Five years later one may not be able to recall just the one heading under which he indexed an article, but is sure to remember one out of the several headings of the cross-indexing.

After the subject is written on the card, add the name of the paper, with year and page. The card is as yet practically worthless. Add a short description of the article, with your opinion of its value or applications. Perhaps you can place upon the card all of the article that is of value. At least enough must show on the card to give the future searcher after information some discriminating idea of the article and whether it will pay to read it again to aid him in his engineering problem.

If the card is made out of information not in print, it should of course be full. A note book may, however, be needed, and in that case the card will refer to the note book by number or date upon the cover and the drawer number where finally deposited.

The card should be filed away in proper alphabetical order the same day it is made. No accumulation should be allowed, for it soon clogs the work and makes untold disorder. Later in life the busy engineer should handle his papers like his morning mail, reading them as soon as received, marking important articles, and turning them over to an accustomed clerk for index cards and filing.

Where a number of technical papers are to be read each week or month, it becomes essential to learn how to get the cream without drinking all the pans of milk. It is out of the question to read them all thoroughly. Before attempting any reading an engineer should look them all over and note important articles to be read later if possible. In this way there is obtained a general idea of the contents of the papers and also of the relative importance to him of the articles noted. These are then carefully read in the order of merit, so far as time will permit. In this way, one will see and read many things of the first importance, whereas without such a preliminary glance through the papers, they might have been missed. Without going through papers it cannot be known what they contain; while to begin and read as you go results in using up all the time over matter which may be of little relative importance. One must, however, avoid the danger of being satisfied with the preliminary skimming; the thorough reading must follow.

Interior classification, and several classifications just as easily, may be carried on simultaneously throughout the one card index, if found desirable in any business, by means of "tab cards." These are like the supplementary guides, but with numbers or other characters upon them, the projection at the top being raised in a particular place on a card for each particular class, the tab cards being also of different class colors if wished. For example, all things made of brass may be indexed on yellow cards, while still placed in the proper alphabetical places of the things. If a tool index, every tool made of a "brand three" of steel will have 3 on the little projecting tab, and those tabs will show perhaps one inch from the extreme left throughout the entire index.

Yet, remember, that at the start the simplest scheme is the best, and the new maker of the card index will escape the danger of its toppling on account of its own weight of cumbersomeness while the foundation—the habit of adding to the list—is weak. The refinements may come later and for the special indexes, like that for tools.

What may be indexed? Everything. The advertisement clippings previously mentioned may be placed in numbered envelopes, they in numbered drawers, and indexed. Other clippings or pamphlets may be disposed of in the same way. Or material may be pasted in scrap books and the pages indexed in the card index. Some engineers prefer to tear apart all papers and file away only the valuable parts as indexed. Sometimes it is best to insert envelopes, open at the end, of the same size as the cards, into the card index; these envelopes to have subjects as though they were cards, small clippings being placed within. The book of one's own private engineering library are made far more useful by suitable contents references in one's card index.

Commercial literature, in the form of trade catalogues, forms a vast and growing collection of excellent technical and professional matter, which, while sometimes partial, yet is always fresh, and is hence valuable in the experience of every engineer.

A systematic arrangement of catalogues (greatly facilitated if of standard 6x9 inches), giving instant reference to any one wanted, is a very important requirement of all who are designing, building or purchasing. Numbered, they are placed in numbered drawers and indexed with contents on the cards. It is usually possible, in addition, to group catalogues on the same subject into drawers together, if portions are torn apart which relate to different subjects. A cross-index of catalogue subjects is also advisable, unless the plan of the previous sentence is fully realized; and in this a card on one subject will refer the searcher to all the pages and catalogues related.

Articles or theses, as suggested by a writer in the *Engineering Record*, call for an extremely useful application of the card index. In preparing one of these papers the first step should be to jot down on temporary index cards facts of interest and data as collected in consulting references upon the subject. The references should always accompany the notes on the cards. If these notes are of sufficient value to be saved on their own account they should be made on permanent cards as for the index. For bulky data a note of reference only will be sufficient to enable the scheme of the article to be planned. These data as collected are assorted in the order of their se-

quence in the article to be written, and will give at any time at a glance the general outline of the article and its progress. When all data have been collected and the notes arranged in their proper order, it is a very simple matter to write the article with the notes spread out in their proper order at one side. The majority of the notes can be enlarged upon for the article, probably without consulting the references, but by checking off each slip as used in the article time may be taken to consult references without causing confusion.

Correspondence, however extensive, becomes under perfect control when systematized by a card index.

Drawings are indexed on cards, though not in the Index Rerum, as indeed it is not advisable to do with catalogues above mentioned. The card of each drawing serves also for records related to the drawing. These and the following cards are usually of larger size, as 4x6. Obsolete drawings will have their cards withdrawn from the working index. Patterns may be treated in the same way, with card record of dates when made and altered, cost of making, changing and repairing, where shipped and when returned, weight and material of part, etc. Stock accounting is facilitated by a card index, with records of purchases and sales, or receipts and distributions as of a general storehouse; the foreman is enabled to keep close and low stocks, and taking inventory is easier. This is found very successful in the great railway general storehouses where everything is found, from driving wheels to oil, from books to fry pans; porcelain, pins, pig iron, velvet, acids and gunpowder. Employes' records are peculiarly suited by the card index, cards being so easily transferred from active list to left list, or then reinstated. Foremen are apt to keep these by memory only, and a new foreman would be without such a record. Mistakes in wages offered are prevented. Tools are sometimes not used because a workman says he can do a job in less time with an improper tool than would take to hunt up the correct tool. A systematized tool room uses the card index to excellent advantage, for no one can memorize all the special tools and their uses. The making of duplicate tools is also prevented. Factory costs use cards having accurate count of labor and material for each machine carded, where labor was spent, profit and loss being also entered upon the same card. Every maker of any saleable article, and almost any dealer, knows the value of a ready reference record of the cost of his article, or of the markets; costs of freight handling are as easily added, together with the various and fluctuating quotations that may come to his hands. Cost keeping must be so simple that it will be kept up readily; and doing away with clerical labor tends to this. Test department records are kept on cards to good advantage. Such records are expensive, hence should not be buried, but be readily accessible when sudden demand comes, as is so often the experience in that department of a railroad. The secretary of the American Society of Mechanical Engineers, himself an eminent engineer, writes: "I would say that in my opinion the card index is a branch of study which should be made part of every engineer's college course." Briefly, the card index then has the following advantages:

Accessibility—always get-at-able—nothing is buried and lost.

Time-saving—for the searchers after information.

Expansibility—only one end, the beginning. Can enlarge forever and still be as good.

Order—new material inserted into the exactly proper place.

Adaptability—suits every frame of mind, and every sort of business; varied classification.

System—encourages system in vast accumulating data and brings it under general heads of classification.

Divisibility—some cards can be removed for temporary use elsewhere, or for permanent transfer.

Labor-saving—nothing has to be rewritten, saves clerical labor.

Simplicity—can be operated by the inexperienced.

Contractibility—no need of retaining useless, outgrown matter.

No wasting of spaces—it is impossible to apportion blank spaces in books so that they will fill evenly.

Always being up to date.

Rearrangement made easy.

Substitute for memory—supplementing it and becoming independent of existing hired memories.

Classifications within the index—by using tab cards.

In conclusion be it said that engineering periodicals, to the extent that they record or store in ink but do not disseminate information, are fulfilling only a small, a very small, portion of their possible usefulness. It is for each individual student, and even the greatest engineer is still a student, to declare which portion of the paper's usefulness he will accept at once and the day following. Can he afford—you—to neglect the Sibley opportunity of becoming acquainted with all the papers? Form a good habit; it will cling. Learn to doubt; you will afterwards believe better. Feed on the plains of the nations rather than always in your own manger. Share your good things and unite forces; and some day a leader, know how best to lead. Engineering periodicals and the card index are not the fabled philosopher's stone, turning all metals into gold, but an unfading love for our profession can use them, among the other reagents, to bring out the measure of true worth within the capacity of each man.

The annual meeting of the stockholders of the Cambria Steel Co. was held at Philadelphia last week. The report submitted covered the operations from Aug. 15 to Oct. 31 only. The net income from all sources was $819,391, from which $360,263 was deducted for depreciation. The following officers were elected: President, Powell Stackhouse; vice-president, John W. Townsend; secretary and treasurer, W. D. Robinson; assistant secretary and treasurer, Alexander P. Robinson; general manager, Charles S. Price; directors, George F. Baer, Theodore N. Ely, Frank J. Firth, Leonard C Hanna, Effingham B. Morris, Powell Stackhouse, Edward T. Stotesbury, John W. Townsend, and R. Francis Wood.

The annual meeting of the American Tin Plate Co. was held last week. It was informal, no statement having been made concerning the earnings of the company, as this statement is furnished only to the United States Steel Corporation. The annual meeting of the United States Steel Corporation will be held on Feb. 17.

At a meeting of the stockholders of the New Castle Forge & Bolt Co. of New Castle, Pa., recently incorporated, officers for the ensuing year were elected as follows: Frank Ryman, president; W. H. Parks, vice-president; J. N. Martin, secretary and A. B. Whieldon, treasurer. The erection of the plant is being rushed, and it is probable that operations will be commenced early in February.

The annual meeting of the Youngstown Iron & Steel Roofing Co. of Youngstown, O., was held last week and directors were elected as follows: L. E. Cochran, Mason Evans, H. W. Heedy, John O. Pew and G. M. McKelvey. The organization was not perfected, owing to the absence of Mr. Cochran.

The plant of the Elmira Steel Co., Elmira, N. Y., will shortly be placed in operation again. Extensive repairs are being made to the plant by H. H. Ginsberg, the recent purchaser. It is also probable that the plant will be rearranged somewhat, in order to facilitate production.

At a meeting of the stockholders of the Youngstown Iron Sheet & Tube Co., held at Youngstown, O., last week, the recommendation of President Wick and other members of the board of directors to increase the capital stock from $2,000,000 to $4,000,000 was favorably acted upon. It was also decided to increase the board of directors from nine to eleven. The new directors chosen were H. G. Dalton of Cleveland, representing Pickands, Mather & Co., and James Parmelee of Cleveland. S. V. Huber & Co. of Pittsburg, consulting engineers, were engaged to prepare plans for a new open-hearth plant.

The Farrell Foundry & Machine Co., New Haven, Conn., is erecting a new power plant and the machine shop is to be replaced by a structure 325 feet long. The building will be commanded its entire length by a number of traveling cranes.

A handsome panel calendar has been received from the Ohio Fire Brick Co., Oak Hill, O.

SUGGESTED AT THE SHOP.

BY F. O. REMAN.

The man in the shop may have his peculiar weaknesses, but his training keeps him out of lots of trouble that is laying for the rest of the folks. His work keeps him in touch with the mechanical way of doing things, and that is not driven by air pressure only. The rush for something new has an effect upon him as well as everybody else, but he can size up the possibilities by laying the assertions of the promotor side by side with his own experience, and it will usually protect him from mischief. A little conservatism is worth good money, and pays more interest than many other ways of planting the cash. As to how far this conservatism is to go is a matter for everyone to figure out for himself and about the first thing to settle is the question as to whether the investment is a purely legitimate business affair or a lottery.

* * * * *

The woods are full of promising, very promising, schemes to drag the shekels of the toiler into the bright light of the promoter's smile. The old stories are good for a time, and only wilt when the chilling frost of everyday use and investigation takes effect upon these tropical plants. Then the liquid air motors, tempered copper tools, high-speed roller boats, extraction of gold from the sea, and many other alluring propositions come to grief.

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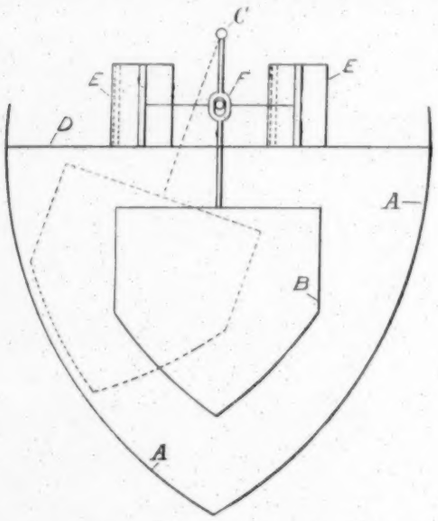
The progress of events brings along some things that would be very interesting if they ever got as far as a trial, but they



balk somewhere between the first declaration of independence and the time of testing. The sketch shows one of these. I came across the model in an eastern engine shop, in a corner of the pattern room. The model was about four feet long, and was evidently intended to show up the scheme in unmistakable style. The sketch shows a section through the hull of a vessel. A is the hull, having a counterweight B hanging from a bearing at C resting on the deck D. There are two cylinders EE on the deck, with the pistons connected together by a rod, and an eye and pin at F couple the pistons and the counterweight B so that the motion of the latter moves the pistons to and fro. The dotted lines give some notion of the result when the ship rolls heavily. The inventor proposes to have this pendulum motor compress air in the cylinders, and then he will use this compressed air to drive the boat, the compressed air taking the place of steam in an ordinary engine.

* * * * *

The model was practical enough to drive the screw around at a lively gait when the hull was vigorously rocked on the bench where it rested; but the rocking elsewhere does not seem to have been so successful, and the company which set out with some $300,000 newspaper capital has slowly made its way from sight. The model remains to prove that some good mechanic made a success of the job up to a certain point, and I am a little sorry that the method of turning the unavoidable rocking of the ship in a useful direction was not carried further for my benefit and at the other fellow's expense. Of course, I don't go into the question as to how far this scheme is of service; the reader can compare it with other devices for the utilization of wave and tidal power. The matter is really how far the advantages that have been discarded in order to install this apparatus are offset by the service this auxiliary generator is able to supply.

* * * * *

I have had a talk with a couple of patent attorneys on a matter that is suggested by the useful nature of an invention. I took the ground that the honest adviser would have something to say to his client in regard to the actual value of the scheme, and would not allow him to throw away his money. Neither of the gentlemen cared to argue the morals of the case, but held that the attorney had no business to pry into the intentions of the patentee, or to do anything more than to take just such legal steps as would entitle him to as broad a patent as the character of the invention should permit. It was not their province to dictate to the inventor what he should do with the patent when issued, provided that they were able to get it allowed in the first place. Occasionally cases came along where some modification of these ideas was made, but as a general rule they were closely followed. I was told that an inventor had brought along a scheme which would have put the ordinary steam generator to shame. The designer had arranged a reservoir, an engine and an air compressor in a sort of endless chain. The compressor was driven by the engine, the engine being operated by compressed air, and the reservoir being charged by the compressor, of course. The attorney to whom this scheme was submitted suggested that the patent office would not look with favor upon anything that savored of perpetual motion, and would hang up the application by a call for a working model. "In any case," my friend pointed out, "the idea is preposterous. You cannot get more out of the machine than you put into it, and the losses from friction, etc., would render the device inoperative." The inventor would not agree to this, but was willing to have the machine tested, and, as the attorney had no time to devote to this work, a plan of operations was prepared for the inventor, who was to put the machine through its paces, the understanding being that the attorney should apply for the patent if the results were favorable to the device. The next week the attorney received a letter to the effect that the test had been thoroughly successful in every particular!

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The lawyer was rather startled at such a report. Obviously the investigation had not been carried out properly, or the results would have been different. The matter of morals had received sufficient attention, and the client deserved a patent if only as a punishment. The application was made accordingly for a patent on the device, with the omission of a link in the chain in order to disguise the perpetual peculiarity. The engine was selected for this omission as having nothing essentially different from any other steam motor.

* * * * *

The two attorneys agreed that this was a justifiable course to take with an invention of this class, but they were not so nearly of one mind in regard to another feature in current patent practice. The claims of patents are becoming more and more puzzling to the average reader. It would seem that the legal draftsman had done his very best to frame a description in as many forms as possible, to see in how many ways he can say the same thing. One of my legal friends asserts that this division of the elements in the machine and their judicious arrangement in successive claims are skillfully designed to avoid infringement. The machine is the more thoroughly covered in all possible combinations, and hence the patent is therefore the broader and more valuable. The other man does not see the thing that way. He says that the more you elaborate the less specific you are likely to get. If you can boil down the claims into a very clear statement of the really valuable features of your invention then you have got something that will hold. I don't profess to say which is right, but there are a host of patents coming along every week, and it is rather sad to think that so few of them will do more than cumber up the records.

15,878,354 Tons of Pig Iron in 1901.

The American Iron and Steel Association has received from the manufacturers complete statistics of the production of all kinds of pig iron in the United States in 1901, also complete statistics of all stocks of pig iron which were on hand and for sale on Dec. 31, 1901. The total production of pig iron in 1901 was 15,878,354 gross tons, against 13,789,242 tons in 1900, 13,620,703 tons in 1899, 11,773,934 tons in 1898 and 9,652,680 tons in 1897. The following table gives the half-yearly production of pig iron in the last five years, in gross tons:

Periods.	1897.	1898.	1899.	1900.	1901.
First half.....	4,403,476	5,869,703	6,389,167	7,642,569	7,674,613
Second half ...	5,249,204	5,904,231	7,331,536	6,146,673	8,203,741
Total.....	9,652,680	11,773,934	13,620,703	13,789,242	15,878,354

The increase in production in the first half of 1901 over the second half of 1900 was 1,527,940 tons, and the increase in production in the second half of 1901 over the first half of 1901 was 529,128 tons. The total increase in 1901 over 1900 was 2,089,112 tons. This is a larger increase than the boom year 1899 showed over the year 1898. The production of pig iron by states and the furnaces in blast and those out of blast at the close of 1901 are shown in the following table. The whole number of furnaces in blast on Dec. 31, 1901, was 266, against 232 on Dec. 31, 1900, and 259 on June 30, 1901:

TOTAL PRODUCTION OF PIG IRON.

States.	Blast Furnaces.				Production. Gross tons of 2,240 lbs. (Includes spiegeleisen.)		
	In blast June 30, 1901.	Dec. 31, 1901.			First half of 1901.	Second half of 1901.	Total for 1901.
		In	Out	Total			
Massachusetts	1	1	2	3	1,952	1,434	3,386
Connecticut	2	2	2	4	4,621	3,821	8,442
New York	6	7	12	19	109,317	174,345	283,662
New Jersey	6	6	5	11	65,524	90,222	155,746
Pennsylvania	101	111	37	148	3,549,148	3,794,109	7,343,257
Maryland	3	4	2	6	157,628	145,558	303,186
Virginia	14	14	12	26	217,819	230,843	448,662
North Carolina	.....	.....	2	2	15,547	11,786	27,333
Georgia	1	1	4	5			
Alabama	29	29	16	45	627,214	597,998	1,225,212
Texas	1	.....	4	4	1,320	953	2,273
West Virginia	3	3	.....	3	74,630	91,967	166,597
Kentucky	4	4	4	8	26,361	42,101	68,462
Tennessee	10	12	9	21	178,244	158,895	337,139
Ohio	48	45	14	59	1,598,850	1,727,575	3,326,425
Illinois	16	15	5	20	739,409	857,441	1,596,850
Michigan	6	5	3	8	93,981	76,781	170,762
Wisconsin	4	2	4	6	124,273	83,278	207,551
Minnesota	.....	.....	1	1			
Missouri	2	1	1	2			
Colorado	2	3	.....	3	88,775	114,634	203,409
Oregon	.....	.....	1	1			
Washington	.....	1	.....	1			
Total	259	266	140	406	7,674,613	8,203,741	15,878,354

Production, according to fuel in 1901, is shown in the table below. It gives also the unsold stocks in the hands of makers, according to fuel, at the end of the four half years, terminating June 30, 1900, Dec. 31, 1900, June 30, 1901 and Dec. 31, 1901. The production of charcoal pig iron in 1901 was 360,147 tons, against 339,874 tons in 1900. The production of mixed charcoal and coke pig iron in 1901 was 23,294 tons, against 44,608 ton in 1900:

UNSOLD STOCKS AND PRODUCTION ACCORDING TO FUEL.

Fuel.	Stocks Unsold Gross tons of 2,240 lbs.				Production. Gross tons of 2,240 lbs. (Includes spiegeleisen.)		
	June 30, 1900.	Dec. 31, 1900.	June 30, 1901.	Dec. 31, 1901.	First half of 1901.	Second half of 1901.	Total for 1901.
Bituminous	209,978	261,407	197,396	42,426	6,597,379	7,185,007	13,782,386
Anthracite	105,233	110,127	113,117	12,007	865,024	847,503	1,712,527
Charcoal	18,799	62,578	58,083	15,950	194,231	165,916	360,147
Char. and coke	4,043	8,258	3,964	264	17,979	5,315	23,294
Total	338,053	442,370	372,560	70,647	7,674,613	8,203,741	15,878,354

The mixed "charcoal and coke" iron referred to above is the product of Georgia and Tennessee charcoal furnaces. The statistics of stocks of unsold pig iron do not include pig iron made by the owners of rolling mills or steel works for their own use, but only pig iron made for sale and which has not been sold. The stocks of pig iron which were unsold in the hands of the manufacturers or which were under their control at the close of 1901, and were not intended for their own consumption, amounted to only 70,647 tons, against 442,370 tons at the close of 1900 and 372,560 tons on June 30, 1901.

The American Pig Iron Storage Warrant Co. held in its yards on Dec. 31, 1901, 3,000 gross tons of pig iron of which 2,400 tons were coke and 600 tons were charcoal iron. None of this iron was controlled by the makers. Adding this 3,000 tons to the 70,647 tons of unsold stocks above mentioned we have 73,647 tons of pig iron which were on the market at the close of 1901. The distribution of unsold stocks at the end of the last four half-year periods is shown in the following:

TOTAL STOCKS OF UNSOLD PIG IRON.

States.	Gross Tons of 2,240 lbs.			
	June 30, 1900.	Dec. 31, 1900.	June 30, 1901.	Dec. 31, 1901.
New England	2,362	2,791	1,477	684
New York	46,317	34,260	14,930	4,907
New Jersey	23,182	11,500	3,150	648
Pennsylvania	109,811	134,995	138,921	20,750
Maryland	27,963	24,513	21,134	8,477
Virginia				
North Carolina, Georgia and Texas	4,675	8,741	4,388	1,066
Alabama	40,797	49,394	95,815	4,393
Kentucky	4,617	6,673	8,067	3,156
Tennessee	15,829	13,174	11,595	1,361
Ohio	53,821	121,621	37,877	18,299
Michigan, Indiana and Minnesota	8,679	32,708	35,206	6,906
Illinois and Wisconsin				
Missouri and Colorado				
Pacific States				
Total	338,053	442,370	372,560	70,647

STOCKS OF PIG IRON IN PENNSYLVANIA AND OHIO.

Pennsylvania.	Lehigh Valley	13,446	41,664	27,677	3,783
	Schuylkill Valley	26,600	21,895	17,136	4,756
	Upper Susquehanna Valley	25,859	21,103	5,090	1,489
	Lower Susquehanna Valley				
	Juniata Valley	9,476	4,815	7,978	600
	Allegheny County	2,520	1,082	1,069	.....
	Shenango Valley	19,077	22,742	7,209	4,017
	Miscellaneous bituminous	10,213	18,063	19,674	3,139
	Charcoal	3,360	3,692	3,088	3,046
Ohio.	Mahoning Valley bituminous	30,991	80,792	13,568	8,343
	Hocking Valley "	.....	1,200	1,800	.....
	Lake Counties "	4,488	10,761	10,600	1,671
	Miscellaneous "	1,324	8,250	750	.....
	Hanging Rock "	16,413	16,913	9,244	5,773
	Hanging Rock charcoal	605	3,705	1,915	2,582

The production of Bessemer pig iron in 1901 was 9,596,793 tons, against 7,943,452 tons in 1900. The production of basic pig iron in 1901 was 1,448,850 tons, against 1,072,376 tons in 1900. The production of spiegeleisen and ferro-manganese in 1901 was 291,461 tons, against 255,977 tons in 1900. The tables following show the production of Bessemer iron in 1901 by States and in the case of Pennsylvania and Ohio by districts; also the production of basic iron:

PRODUCTION OF BESSEMER PIG IRON.

States.	Production. Gross tons of 2,240 lbs		
	First half of 1901.	Second half of 1901.	Total for 1901.
New York	12,253	16,239	28,492
New Jersey			
Pennsylvania	2,372,483	2,513,394	4,885,877
Maryland	154,082	143,067	297,149
West Virginia and North Carolina	74,630	91,967	166,597
Kentucky and Tennessee			
Ohio	1,330,547	1,406,544	2,637,091
Illinois	650,614	743,816	1,394,430
Michigan, Wisconsin, and Minn	25,569	14,372	39,941
Missouri	62,009	85,207	147,216
Colorado			
Total	4,582,187	5,014,606	9,596,793

PRODUCTION OF BESSEMER PIG IRON IN PENNSYLVANIA AND OHIO DISTRICTS.

Pennsylvania.	Lehigh Valley	58,211	64,979	123,190
	Schuylkill Valley	41,140	41,080	82,220
	Upper Susquehanna Valley	54,606	25,636	80,242
	Lower Susquehanna Valley	262,894	243,983	506,877
	Juniata Valley			
	Allegheny County	1,360,338	1,537,028	2,897,366
	Shenango Valley	360,374	356,441	716,815
	Miscellaneous bituminous	234,920	244,847	479,167
Ohio.	Mahoning Valley	495,708	575,340	1,071,048
	Hocking Valley	.....	.....	.....
	Lake Counties	340,001	409,056	749,057
	Hanging Rock bituminous	25,687	57,589	83,276
	Miscellaneous bituminous	369,151	364,559	733,710

PRODUCTION OF BASIC PIG IRON.

	First half 1901.	Second half 1901.	Total for 1901.
New York and New Jersey	6,235	28,085	34,320
Pennsylvania—Allegheny county	237,593	330,923	568,516
Other counties	198,471	244,273	442,744
Virginia and Alabama	134,598	166,845	301,444
Ohio and Missouri	68,208	33,618	101,826
Total	645,105	803,745	1,448,850

CONTINUOUS SCALE IN BAR AND HOOP MILLS.

By an agreement recently entered into by the Amalgamated Association of Iron, Steel and Tin Workers with the Republic Iron & Steel Co. and the American Steel Hoop Co. there will be no shut down of the mills of either of these concerns next summer pending an adjustment of the wage agreement. While the continuous clause adopted at the last convention provided for conferences until July 1, it also provided that the mills close on that date unless an agreement on the scale has been entered into. At the last bi-monthly conference for the settlement of the bar iron scale, however, the new arrangement was made, which will prove highly satisfactory to both these companies. On the other hand, no agreement of this kind has yet been entered into with the American Tin Plate Co. and the American Sheet Steel Co. The independent mills employing members of the association will be in position, however, to operate their mills no matter whether the big companies reach an agreement or not, for the reason that they sign the scale on July 1 conditionally, and they have the same terms after agreements are reached that the big companies have.

The annual convention of the association will be held in Wheeling, W. Va., commencing April 15, and it will, no doubt, be May 1 before any scales are formulated. They will then be presented to the manufacturers, and if no agreement is reached by June 15 a conciliatory board is appointed for the purpose of adjusting matters. In the case of the sheet and tin plate scales this board must reach a conclusion before July 1 or the mills are closed pending an agreement.

The lodges of the association have been asked to submit suggestions for changes in the scale, and these are to be forwarded to the association headquarters before Feb. 17. They are then printed and acted upon in convention. It is not probable that any advances will be asked for by any of the trades, and this will make the final adjustment of the scales an extremely easy matter. All scales at the present time are on a basis satisfactory to the men, and up to the present time not a lodge has suggested an advance in the scale base for any of the trades.

The administration of the association will urge one radical change, which will, no doubt, be acted upon favorably by the association in convention. The mill committees, as at present constituted, are not at all satisfactory. At the present time all grievances are referred to the mill committees, and by them in turn to the district vice-president. Since the formation of the combinations, however, the mill manager has no power to adjust matters, and many grievances are oftentimes not adjusted for several months. It is proposed to do away with the mill committees entirely, and to appoint or elect district vice-presidents, who will be paid a salary by the association for looking after matters in their respective districts. In this way it is believed that grievances can be acted upon more speedily, since it will be the district vice-president's chief duty to look after matters of this kind.

Efforts will also be made to have the convention adopt a scale that will be operative for a term of three years instead of one year. If this can be done it will mean much to the manufacturers to whom the annual uncertainty has become a veritable nightmare.

President Shaffer will be a candidate for re-election, as he wants his strike policy vindicated by the association. That he will have considerable opposition is already apparent, and one of the strongest candidates now in the field is M. F. Tighe, assistant secretary of the association. Mr. Tighe is a resident of Wheeling, where the convention is to be held, and he will have a solid delegation from the Wheeling district. President Shaffer's contention at present is that he opposed the strike, but was forced into the struggle by other members of the executive committee.

This week it was announced that no more strike benefits would be paid by the association to members who refused to return to work in mills lost to the association on account of the strike. These benefits have been paid for the past nineteen weeks, and the treasury of the association, nearly depleted in the late strike, is in no condition to stand the drain any longer. Many of the lodges refused to pay the assessment for the support of these strikers, and they have been notified that unless these benefits are paid they will not be permitted to representation in convention. Whether the members of the association employed in the mills of the Illinois Steel Co. will be permitted to participate in the convention has not yet been decided upon, for the reason that these members have not asked as yet to be represented.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Industrial Machine Co. of Phoenix, Oswego Co., N. Y., has been incorporated with $25,000 capital. W. H. Haberle, P. G. Hermance and Edward Oswald are the incorporators.

The J. G. Duke Machine Co. of Memphis, Tenn., has been incorporated with $25,000 capital by J. G. Duke, T. L. LaMalta, A. S. Edmondson, W. E. Graves and C. H. Thompson.

W. H. Anderson & Sons, tool manufacturers of Detroit, Mich., have incorporated with $50,000 capital.

The Smith Machine Co. of Milwaukee, Wis., has been incorporated with $15,000 capital by Thomas L. Smith, J. R. Smith and Arthur J. Buckley.

The Chicago Pump Governor & Machine Co. has been incorporated with $5,000 capital to manufacture machinery and governors. James C. Bane, Ira E. Hoolittle and A. D. Hoeffel are the incorporators.

A steel tank and car plant is to be located in the center of the Texas oil field in Beaumont, Texas. The new company will be capitalized at $25,000.

The Mechanical Boiler Cleaner Co. of Boston, Mass., has been incorporated with $300,000. A. E. Knowlton and W. P. Huelin are the incorporators.

The Simpson Manufacturing Co. of Menaha, Wis., has been incorporated with $10,000 capital to manufacture hardware specialties. Newton Simpson, F. V. Thompson and John B. Bacon are the incorporators.

The Cresswell & Waters Co. of Philadelphia, Pa., was recently formed by the consolidation of the David S. Cresswell and the Goodell & Waters iron foundries and was incorporated with a capitalization of $250,000. Both foundries are well known to the trade, the former having been formed in 1840 and the latter in 1860.

The Tucker Manufacturing Co. of Newark, O., has been incorporated with $50,000 capital to operate a sheet plant.

The Battle Creek Foundry & Malleable Iron Co. of Battle Creek, Mich., has been incorporated with $400,000 capital to operate a malleable foundry. F. E. Halladay has been elected president; A. M. Slay, treasurer and Joseph Fillingham, general manager.

The Monarch Blast Furnace Co. of St. Louis, Mo., has been incorporated with $150,000 capital by A. W. Oliver, W. A. Thomas and F. P. Fay. The Jupiter stack, located in South St. Louis, will be operated by the new company. The furnace has been idle for several years.

The American Motocar & Machine Co. has been granted a New Jersey charter with a capital of $500,000. Frank G. Walter, J. A. MacPeak and F. R. Hansell are the incorporators.

The Stanton Co. of Manchester, Va., desires to purchase a new or second-hand 75-h. p. boiler and a 40-h. p. engine.

The Lookout Boiler & Mfg. Co., Chattanooga, Tenn., is in the market for a 15-ton traveling crane, 30 ft. span.

Sprout, Waldron & Co., Muncy, Pa., ask for quotations on a No. 3 universal cutter and reamer grinder.

The Electrical Machinery Co. of Minneapolis, Minn., are in the market for some new equipment, including an electric traveling crane.

The Matthews Steel Casting Co. has been organized at Matthews, Ind., by John Clifton, John H. Wood and Geo. N. Catterson.

The Hard Steel Wire Fence Co. of Cuyahoga Falls, O., has been incorporated, and will build a plant immediately, which will be devoted to the manufacture of wire fencing exclusively. R. R. Littleton will be general manager.

The Monmouth Plow Co., recently incorporated with a capital of $100,000, will build a plant in Monmouth, Ill. The main building will be three stories high, 80x300 feet; the blacksmith shop one story high, 80x300 feet; the assembly room one story, 80x100 feet, and the engine room, 40x60 feet. John S. Brown is president of the new concern and T. H. Spicer, secretary.

The Marine Boiler Works Co. has been organized at Toledo, O., with the following officers: C. Leeker, president;

R. Reeves, vice-president and general manager; C. B. Lloyd, secretary.

The Morgan Motor Co. of Worcester, Mass., has been organized under the laws of Massachusetts with an authorized capital stock of $50,000. The new company will make a specialty of steam trucks. The organizers are Charles H. Morgan, president, who is also president of Morgan Construction Co. and Morgan Spring Co. of Worcester, Paul B. Morgan, treasurer, and Ralph L. Morgan of the Toledo plant of the International Motor Car Co.

The J. G. Duke Machine Works, Memphis, Tenn., has been incorporated with a capital stock of $25,000. The incorporators are J. G. Duke, T. L. Malta, J. E. Richardson and W. E. Graves.

The Acme Metal Mfg. Co., Chicago, has been incorporated with a capital stock of $20,000. The incorporators are Edgar C. Moran, Rudolph Otto and William C. Peters.

Peacock's Iron Works, Selma, Ala., are in the market for pipe cutting and threading machinery.

Fires and Accidents:—

Fire damaged the plant of the St. Louis Iron & Steel Co., St. Louis, Mo., to the extent of $15,000.

The stove manufacturing plant of the Henry Wetter Manufacturing Co., Memphis, Tenn., was destroyed by fire last week, entailing a loss of $200,000.

The plant of the Dobbie Foundry & Machine Co., Niagara Falls, N. Y., was damaged by fire last week to the extent of $5,000.

New Construction:—

The plans for Kenney & Co.'s machine shops at Scottdale, Pa., provide for a main building 50x320, and a wing on either side 30x320 feet. The foundry will occupy 120 feet of the main building and will be commanded by an electric traveling crane.

The W. J. Sharron Foundry & Machine Co. will erect a foundry and machine shop 89x120 feet at Wichita, Kan.

The capacity of the plant of the Henry Vogt Machine Co., Louisville, Ky., will be largely increased by the erection of five additional buildings. Contracts have already been let for three one-story buildings for a foundry, pattern shop and lumber house.

Plans for the erection of the new Clarage foundry at Kalamazoo, Mich., have been prepared, and the contracts for the buildings will be let shortly. The main building, which will contain the molding floor and core room, will be 70x150 feet, while a one-story building 50x60 feet will be used as a store house for patterns. A building 50x100 feet and two-stories high, already erected, will be fitted up for a machine shop and cleaning department.

It is reported that the Peru Steel Casting Co., Peru, Ind., is arranging to double the capacity of its plant by the installation of a large amount of machinery and the enlargement of its foundry.

The Michigan Malleable Iron Works, Detroit, Mich., will largely increase its capacity this spring by the erection of several additional buildings.

Kruecke Bros. will erect a foundry at Milwaukee, Wis.

The Atlantic Screw Co., Hartford, Conn., will erect an additional building to its plant 50x200 feet in dimensions.

The Petroleum Iron Works, Washington, Pa., will increase the capacity of their plant by the erection of an additional building 38x100 feet. Three more punches are to be installed, in addition to pneumatic hoisting machinery.

The Griffin Wheel Co. has taken out permits at Denver, Col., for the erection of two foundry buildings, one, 50x108 feet, to cost $6,100; the other, 50x269 feet, to cost $10,000, and for an office building to cost $1,600.

The new foundry and structural iron plant of the Lamb Manufacutring Co. at Sioux City, Ia., is fast nearing completion. The plant is 140x112 feet.

The St. Louis Iron & Steel Foundry Co., St. Louis, Mo., whose plant was recently destroyed by fire, will rebuild at once. Alfred W. Henry is vice-president.

The Michigan Stove Co., Detroit, Mich., has had plans prepared for a six-story addition, 76x130 feet, to cost $37,000.

It is reported that the Lizzie Lowman Stove Works, Sheffield, Ala., will erect an additional building to its plant, and install new machinery.

Richards Bros., Knoxville, Tenn., will build a wheel foundry at a cost of $10,000.

The Nordberg Mfg. Co., Milwaukee, Wis., will build a foundry building, 120x350, in the town of Lake.

Kelley, Maus & Co., Chicago, has had plans prepared for the erection of a fireproof warehouse to cost $225,000.

Hanks Foundry & Stove Co., Rome, Ga., incorporated some weeks ago, has let contracts for the erection of its plant.

The W. J. Sharron Foundry & Machine Co. has decided to locate at Wichita, Kan., and a site for the plant has been purchased, 89x120 feet.

The Stark Rolling Mill Co., Canton, O., will add two more hot mills to the four now in operation in the plant.

The Wichita Bridge Co. of Wichita, Kan., which will shortly be incorporated with $25,000 capital, will erect a structural fitting shop at Wichita, 40x140 feet.

The Paris Mfg. & Implement Co. of Paris, Tenn., will enlarge their plant by the addition of a foundry and other buildings necessary to a complete implement factory.

The Lodi Steel Box Mfg. Co. have been organized at Lodi, O., with a capital stock of $25,000.

Blonder Bros. of Chicago will erect a new factory which will make a specialty of the manufacture of iron bedsteads.

At a recent meeting of the directors of the American Frog & Switch Co., Hamilton, O., it was decided to double the capacity of their plant.

Plans are being prepared for extensive additions to the plant of the Hollidaysburg Iron & Nail Co. of Hollidaysburg, Pa. The new power equipment will include a couple of large engines with the necessary boilers and other accessories.

An addition will be built to the plant of the Ohio Motor Co., Sandusky, O.

The Keystone Foundry Co. of Uniontown, Pa., will extend their plant by an addition, 70x100 ft.

B. A. Groah & Co. have secured the contract for the new foundry and machine shop to be built for the A. W. Cadman Mfg. Co. of Pittsburg.

The Pittsburg District:—

The Crucible Steel Co. of America has leased a portion of the fourteenth and all of the thirteenth floors of the Frick Building. The offices will be removed from the Empire Building on April 1.

The Riter-Conley Manufacturing Co. has been awarded the contract for the erection of a brick and steel building for the Standard Plate Glass Co. at Butler, Pa. The building will be 520 feet long and 140 feet wide.

The Pittsburg Department of Public Works last week awarded the contract for two 15,000,000-gallon pumping engines to the Allis-Chalmers Co. of Chicago, Ill.

The McKenna Brass Co. of Pittsburg has decided to set aside 10 per cent of its net profits annually for distribution among its employes remaining on the pay roll at the end of the year. The profits to be shared will come from the manufacturing portion of the plant and not from the contract or sales department.

E. B. Knapp, state agent for Ohio and Michigan for the Paige Woven Wire Fence Co., accompanied by 14 local agents of Ohio, inspected the plant at Monessen last week.

Contracts for the machinery for the recently organized Standard Steel Car Co. were placed during the past week. The location of the plant has not yet been definitely decided upon, but it is probable that this will be known within a few days. Three presses varying in capacity from 100 to 1,000 tons, have been ordered from the Mackintosh-Hemphill Co. of Pittsburg. The Hilles & Jones Co. of Wilmington, Del., will furnish the punches and shears, while the riveters will be furnished by the Chambersburg Engineering Co., Chambersburg, Pa. The electrical apparatus will be furnished by the Westinghouse Electric & Manufacturing Co., and the electric cranes will be furnished by the Shaw Crane Co. of Muskegon, Mich. Temporary offices of the company have been opened in the Bijou Building.

At the annual meeting of the Bessemer Coke Co. of Pittsburg, held last week, plans for the erection of 200 coke ovens at the Griffin plant in the Klondike region were approved.

An issue of $200,000 in bonds was approved and the purchase of 300 acres of coking coal adjoining the Griffin plant was approved. The plant will have an annual output of 600,000 tons of coke and 200,000 tons of coal before the end of the year. W. Y. Humphries was re-elected president; Joshua W. Rhodes, vice-president; Herman Griffin, treasurer and William Harris, secretary. E. H. Jennings, D. C. Byers and R. L. Martin with the officers compose the board of directors.

The capital stock of the Columbia Bridge Co. of Pittsburg, with works at Carnegie, Pa., has been increased from $100,000 to $300,000. It is the intention of the company to increase the size of the plant and a building will be erected for rolling shapes for the Pittsburg Steel Shafting Co. of Rankin, Pa.

The Geo. A. Hogg Iron & Steel Foundry Co. of Pittsburg is at present crowded with orders, running its plant night and day, with work enough ahead to keep it running for seven or eight months. Among the principal contracts that are being worked on, is the machinery for the plant of William Jessop & Sons, which is now being erected at Washington, Pa. The order for Jessop & Sons covers the rolling mills, shears and roll lathe. An order from the Colonial Steel Co. of Pittsburg calls for five vertical double mandrel shears, motor driven. Each of these shears will weigh from 50,000 to 60,000 pounds. An order from the Hager Steel & Iron Co. of St. Louis is for one double vertical lever shear. Other orders are from the American Sheet Steel Co. of Pittsburg, for one 55-inch and one 38-inch roll lathe, from the Crucible Steel Co. to equip its Spaulding and Jennings plant at Jersey City with the Freeman furnace charger, from the Montreal Rolling Mills Co. of Montreal, Que., to equip the plant with the Freeman furnace charger, also an order from the Wright Shovel Co. of Anderson, Ind., for a 22-inch mill complete.

J. E. Whittelsey, who has been the Pittsburg representative of the Murphy Stoker Co., has resigned to accept the position of Pittsburg representative of the Heine Safety Boiler Co. of St. Louis.

Owing to the large increase in the demand for the Wickes water tube boiler in the Pittsburg district, George F. Lemon, formerly connected with the Chicago office of Wickes Brothers, has been transferred to the Pittsburg office to take charge of the boiler department.

General Industrial Notes:—

Owing to the delay in receiving machinery the new ten-mill plant of the Jackson Tin Plate Co. at Clarksburk, W. Va., will not be placed in operation until about March 1.

On Wednesday, Jan. 22, the Ohio plant of the National Steel Co. at Youngstown, O., broke all its records. In 24 hours 1,123 ingots were turned out, amounting to 2,462 tons. The best previous record was made on Dec. 12, when 2,440 tons were produced.

At the annual meeting of the Belfont Iron Works Co. of Ironton, O., held last week, a semi-annual dividend of 15 per cent was declared. B. H. Burr was elected president and S. G. Gilfillan a director, to fill the vacancy occasioned by the death of John G. Peebles. The directors decided to erect another blast furnace adjoining the present stack. It is also reported on excellent authority that a rod mill and a wire and wire nail plant will also be erected. At a meeting of the Kelly Nail & Iron Co., H. E. Bradley of Columbus, O., and F. C. Tomlinson of Ironton were elected directors to fill the vacancies caused by the deaths of Charles Parrot and E. L. Hineman of Columbus, O.

At a meeting of the stockholders of the Crawfordsville Wire & Nail Co. of Crawfordsville, Ind., held last week, officers for the ensuing year were elected as follows: W. P. Herron, president; Clifford Voris, manager and treasurer and R. Schweitzer secretary. The work of rebuilding the plant recently destroyed by fire is progressing favorably.

The plant of the Ohio Steel & Specialty Co. at Cuyahoga Falls, O., will be placed in operation about Feb. 15. The company was recently incorporated under the laws of New Jersey for $75,000.

Twelve puddling furnaces, muck and rolling mills of the Eleanor Iron & Steel Co. at North Irwin, Pa., were placed in operation last week. The plant will be operated double turn shortly.

The old rail mill of the Lackawanna Iron & Steel Co. at Scranton, Pa., which was built in 1847, is being dismantled and the machinery is being moved to Buffalo. The last rails were rolled last week.

The Durham furnace near Riegelsville, Pa., has been sold by Cooper, Hewitt & Co. of New York to parties interested in the Quakertown & Eastern Railroad. The purchasers have formed a stock company under the name of the Durham Iron Co.

The William Tod Co. of Youngstown, O., has booked an order for a 54x66 inch return crank reversing blooming engine to be installed in the plant of the Youngstown Iron Sheet & Tube Co. at Youngstown. The Republic Iron & Steel Co. has contracted for a duplicate of this engine, which will replace the present one in the blooming mill at the Bessemer plant.

The Enterprise Foundry Co. at Bristol, Tenn., has been placed in the hands of a receiver, H. D. Reynolds. It is probable that matters will be adjusted to the satisfaction of the creditors.

Stack No. 5 of the Allentown Iron Co., Allentown, Pa., is being overhauled, preparatory to placing it in blast. The furnace was recently leased by the Empire Iron & Steel Co. The furnace will be ready to blow in in about two months.

The plant of the Keating Wheel & Automobile Co., Middletown, Conn., was sold last week to the Eisenhuth Horseless Vehicle Co. of New York for $210,000. The Keating plant was in the hands of a receiver for two years.

At a meeting of the stockholders of the Virginia Bridge Co. of Roanoke, Va., held last week, it was decided to increase the capital stock from $100,000 to $200,000. The increase in the capitalization is to provide for large additions to be made to the plant.

On Wednesday, Jan. 15, the open-hearth plant of the Sharon Steel Co., Sharon, Pa., produced 925 tons of finished steel, which is the best record yet made by this plant. It is probable that the output will shortly reach 1,000 tons daily.

The third furnace of the Thomas plant of the Republic Iron & Steel Co. at Thomas, Ala., will be blown in about March 1. There are plans for a steel plant in connection with these furnaces, but they have not yet taken definite shape.

At the annual meeting of the stockholders of Brier Hill Iron & Steel Co. of Youngstown, O., held last week, directors were elected as follows: George Tod, Henry Tod, William Tod, J. G. Butler, Jr., and H. H. Stambaugh. George Tod was elected president and J. G. Butler, Jr., general manager.

The rod mill of the Cuyahoga Steel & Wire Co., Cuyahoga Falls, O., has started up after being idle for several weeks. A new 1,000-h. p. engine has been installed.

The Ball Engine Co., Erie, Pa., has installed in the plant of the Stromberg-Carlson Telephone Co., Chicago, a direct-connected engine and generator.

On Wednesday, Jan. 8, Muirkirk Furnace, Muirkirk, Md., was blown out for want of charcoal, on account of car shortage and failure of railroad company to deliver cars already loaded with charcoal.

The McFadden Co. of Philadelphia, lately known as the Mechanics' Tool Co., was sold out under bankruptcy proceedings, Jan. 22. Their stock, appraised at $28,000.00, brought but $9,100 at the sale.

The La Belle Iron Works, now building a large plant near Steubenville, O., have formed a land company, which will establish a suburban town to provide homes for the 1,500 men who will find employment in the new works.

The plant of the Mansfield Machine Works was purchased some time ago by the Aultman & Taylor Co. of Mansfield, O., and will be used by the latter for the manufacture of small boilers, threshing machines, etc.

At the annual meeting of the Cleveland-Cliffs Iron Co., held Jan. 22, the following officers and directors were re-elected: President and treasurer, Wm. G. Mather; vice president, J. H. Wade; secretary, J. H. Sheadle; auditor, R. C. Mann; J. H. Wade, Wm. G. Mather, J. H. McBride, E. R. Perkins, S. E. Williamson, W. S. Tyler, J. H. Hoyt, Sam'l Mather, Peter White. The company has a paid-in capital stock of $3,814,700.

Thos. A. Mack & Co. of Cincinnati, pig iron dealers, announce that they have opened a branch office at 601 Empire Building, Pittsburg, to be in charge of B. A. Wallingford, Jr., assisted by O. W. Mason.

COCHRANE OIL SEPARATORS.

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There are lots of engineers and steam users who do not believe *Oil CAN BE easily and successfully removed from exhaust steam* Fact is, they are wasting tons of good, pure water and tons of coal that cost money, rather than take any chances—either because they have heard of plants where failures were made, or because they had a few personal experiences—and yet we, with our COCHRANE OIL SEPARATORS, are giving the very results they think cannot be obtained! We are giving thorough and complete protection to boilers from the oil in the exhaust steam used for heating, by direct, actual contact, the water fed into these boilers, or from the oil in exhaust steam used in heating systems where the condensation is returned direct.

If we had out only one or two successful Oil Separators, or only a half dozen, or maybe fifty all told, some doubt might exist that we could help them, conditions varying in different plants; then not everyone can afford the time to investigate the hows and the whys—so we just clinch all our arguments that exhaust steam, because a waste product, should be used wherever possible, by referring to the fact that *more than four millions (4,000,000) of horse power of boilers are kept free from oil by*

COCHRANE OIL SEPARATORS!

If we can do it for so many boilers, the chances are mighty good that we can protect your boilers, no matter what the conditions, for our experience gives us the knowledge of what we can and what we cannot do.

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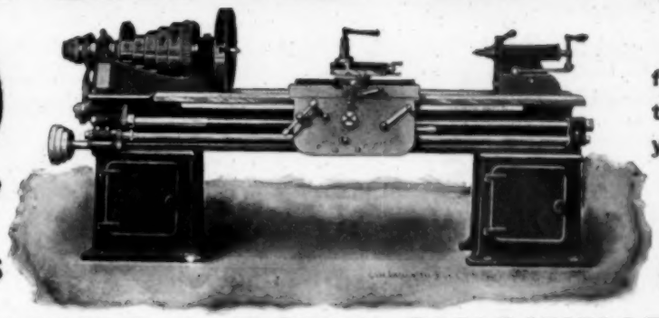

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Is an important adjunct to steam power plants, because for every 10 degrees added to the temperature of the feed water, about one per cent of the total cost for fuel will be saved.

210 DEGREES IS EASILY OBTAINABLE with the Stilwell Heater when you have sufficient exhaust steam, as every facility is provided for bringing the steam and water together in such a way as to heat the water to the highest possible temperature.

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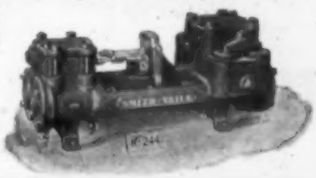

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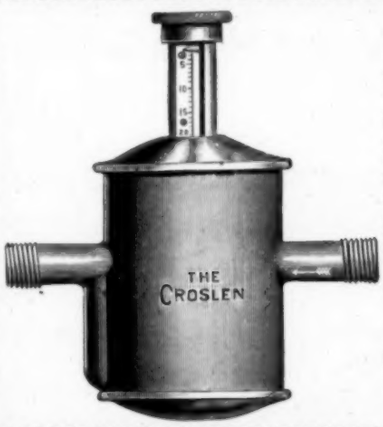

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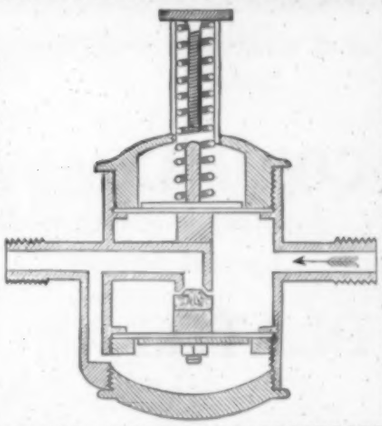

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HORSE SHOES, "Juniata" brand, iron or steel, in all sizes and patterns. Toe Calks.

WIRE ROPE of every description and for all uses, and wire rope fittings. From largest to smallest sizes down to sash cord and clothes-lines.

COLD DRAWN STEEL, Shafting, Free Cutting Screw Steel. Roller Bearing Rods. Rounds, Squares, Hexagons, Flats and Special Shapes.

PLATES AND SHEETS of Bessemer and Open Hearth Steel.

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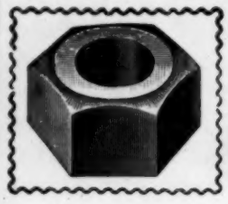

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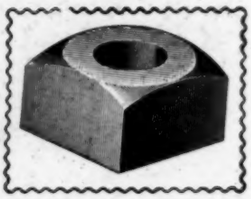

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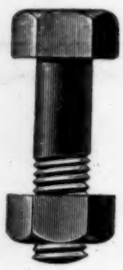

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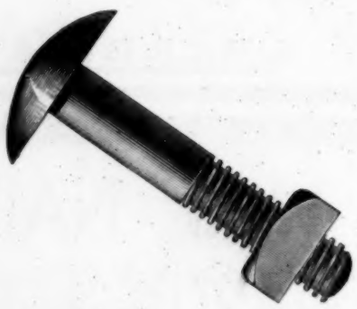

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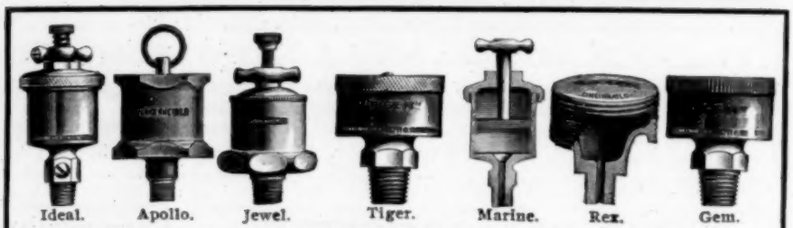

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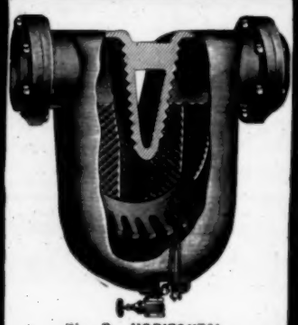

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